Chemical Age

I.C.I. Petrochemical Facilities Largest Outside U.S.
(page 339)
VOL. 82 No. 2097

19 September 1959

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(continued on page 326)

INDEX TO ADVERTISERS

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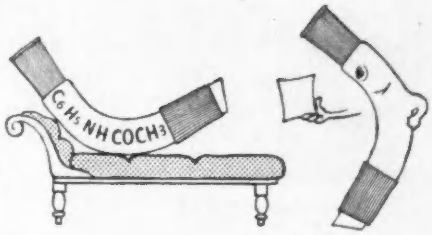

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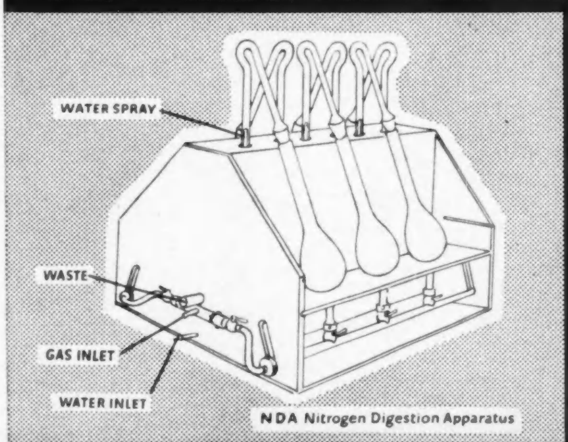

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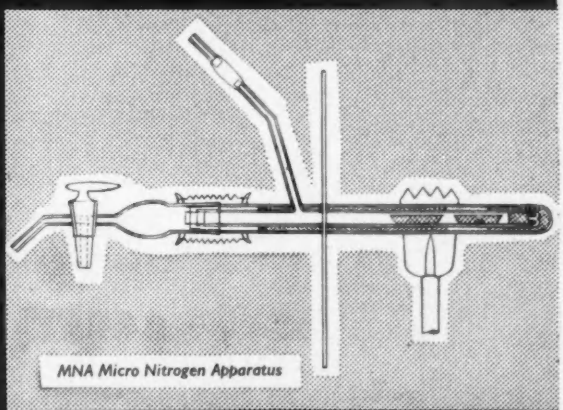
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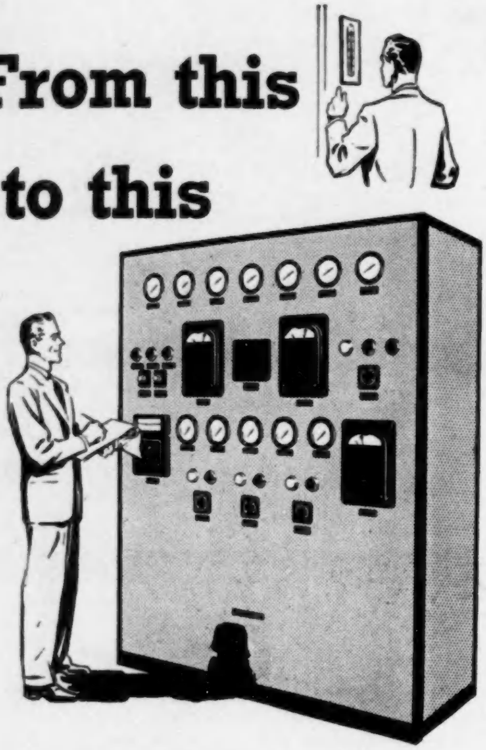

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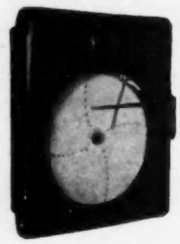

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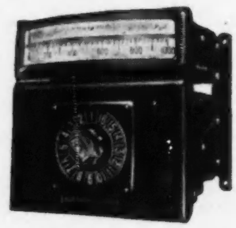

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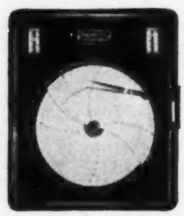
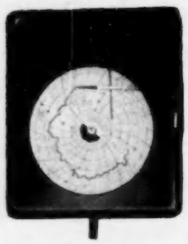


Air-operated compound controller

Dial Pressurestat



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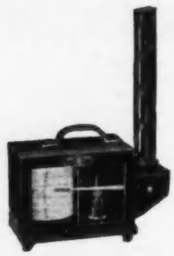

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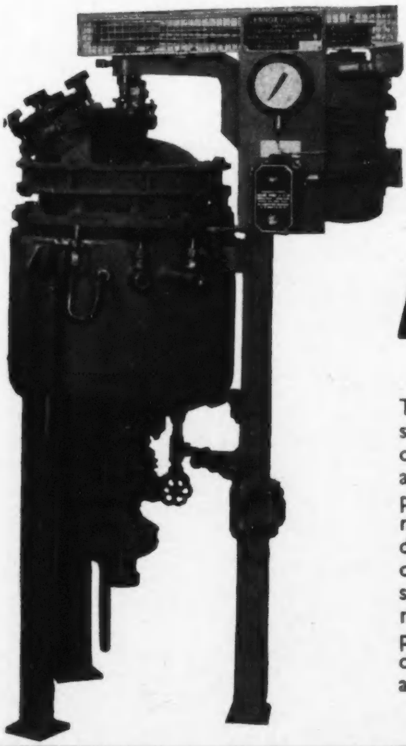

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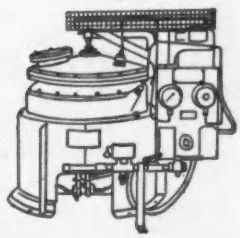

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IN THIS ISSUE

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A SCIENCE MINISTRY

BOTH in this country and America the need for a Government science department has been discussed over the last few years. The appointment of a Minister of Science was seriously brought to the attention of the scientific community here at the 1958 annual dinner of the Institution of Chemical Engineers by Sir Hugh Beaver, president of the I.Chem.E. This year, again on the occasion of the Institution's dinner, Lord Hailsham, Lord President of the Council, with responsibility for D.S.I.R. etc., considered the points raised by Sir Hugh, and indicated that he did not think there was a need for a Minister of Science.

Now, some few months later, with the General Election less than a month away, we have the Conservative plan for the next five years. Mr. Macmillan, as leader of the party, states that the Conservatives are determined to keep Britain a great and go-ahead country, *leading the world in important branches of technology, and translating its technological advance into productive capacity with a high and rising rate of investment.* How will they set about this task in the next five years if returned to power? By appointing a Science Minister.

The manifesto states that one Cabinet Minister will be given the task of promoting scientific and technological development. Sensible of the nature of the appointment, the party realises that it would be wrong to concentrate all Government scientific work into a single industry, so the Minister of Science is envisaged as having responsibility for the Department of Scientific and Industrial Research, the Medical and Agricultural Research Councils and the Nature Conservancy, the atomic energy programme, and the U.K. contribution to space research.

Development of nuclear energy for peaceful purposes is to be pressed ahead, a conference is to be called for those concerned in industry and education to forward the spread and understanding of automation. New inventions and the development of new techniques will be encouraged.

At present, D.S.I.R., the M.R.C., the Agricultural Research Council and the Nature Conservancy are the responsibility of the Lord President of the Council, the atomic energy programme is directly under the Prime Minister and the space programme has been placed under the Minister of Supply. It is obvious that some of the Minister of Power's present duties would come under the control of the Minister who is given science. At the same time, as much of the atomic energy programme is concerned with the production of electrical power, the Minister of Science would have to ensure that the Minister of Power is satisfied with atomic power research.

Creation of the Minister of Science is also foreseen as allowing for the abolition of the Ministry of Supply. At present this Ministry is subordinate to the Ministry of Defence with regard to scientific functions. With a Ministry of Science in being this unsatisfactory situation would be removed and would allow it direct Cabinet representation and so ensure a better relationship between Government and science.

Advantages that can be pointed out for a central government science department are that policy decisions on science and research could be made. Also co-ordinated planning would give a balanced progress in science,

avoid duplication of effort and prevent waste of scientific manpower.

It has been suggested by Lord Hailsham that science does not lend itself to consolidation or isolation in one organisation and that a Ministry of Science could isolate from science the daily conduct of public affairs. These dangers have evidently been considered, as is indicated by the wording of the manifesto.

Obviously, it is worthwhile putting such an appointment to the test, and its success will necessarily have to be judged as the experiment proceeds. The greater problem is who the new Minister of Science might be. This will need considerable thought.

U.S. CHEMICAL INDUSTRY

WHAT is the state of the U.S. chemical industry this year? It will be recalled that last year, in the third quarter, the industry was just showing a recovery from the recesion. A special survey by *Chemical and Engineering News* (1959, **37**, No. 36, 59) indicates that not only has the industry recovered, but in many instances, is booming.

Financial reports of chemical companies for the last six months of 1959 have indicated substantial recovery from the downward trend of early and mid-1958. The improved sales picture has been marked by record dollar volumes, particularly during the second quarter. Net earnings have, in some cases, risen to new high levels. Typical of the medium-size chemical producer are a 15% increase in sales over the corresponding period in 1958 and net earnings up nearly 50% for the same period.

Optimism in the U.S. industry's future is linked with new products, new markets, new uses and higher sales. Some U.S. executives think the growth pattern has or will start to slow down. Others consider that for some years to come the chemical industry will continue to push ahead at the average rate of 7% per year, which rate it has maintained over the past 20 years as compared with the 3% for all industry.

Official estimates of the U.S. Department of Commerce earlier this year indicated chemicals and allied products sales of $24.4 billion—a 5% increase over 1958 and 3.9% above the high level established in 1957. These estimates are now felt to be a little low in the face of the published record for the first six months of 1959.

The Federal Reserve Board's production index for chemicals and allied products for the first five months of 1959, averaged 204, 13% above the same period a year ago. The production index for industrial organic chemicals averaged 226 for the first quarter of 1959, 9% above the same quarter a year ago; basic inorganic chemicals averaged 220 for the first quarter, 9% above the same period a year ago. Also, as of June 1959, chemical inventories registered a dollar value of $3.77 billion, equal to one and three-quarters month sales.

In the first six months of this year, the number of chemical production workers employed showed a 2.9% increase over the same period of a year ago. Weekly earnings for the industry as a whole continued upward averaging 5.7% more than in the same period of 1958. The cost of living index, however, also rose by 0.5% in the first half of 1959.

The price index for chemicals continued slightly downward during the first six months of 1959, averaging 0.7% below the same period in 1958. Based on the first half 1959 data, the U.S. chemical industry's wholesale price index has risen only 10% above the base period 1947-49, compared with a 28% increase for all commodities other than farm products and foods. Most observers, in fact, agree that the chemical industry will continue to be faced with rising costs, increasing competition and, hence, static or lower prices for some time to come. Facing up to this situation U.S. chemical manufacturers have outlayed heavily for new plant and facilities, so putting more new efficient equipment into operation.

First quarter 1959 data show that the industry maintained its position of fourth in size among all U.S. manufacturing industries, according to assets, with a new high value of $21.9 billion. The profit picture which began to show in the last quarter of 1958 has continued into the first quarter of 1959, which is $494 million, 43% above the same quarter of 1958. This represents a profit-sales ratio of 7.7% as against 6.4% a year earlier.

According to the Securities and Exchange Commission, capital outlays by the chemical industry are likely to total $1.2 billion this year—4% less than in 1958. It is anticipated that in the second half of the year, construction may rise as much as 16% above the first half. Excess supply has affected such items as nitrogen, butadiene, low-pressure polythene, chlorine and pentaerythritol. However, estimates state that the industry as a whole has been operating at more than 80% of capacity in recent months compared with an estimated 72% in 1958.

Although business tapered off last year, the chemical and allied products industry, apart from the U.S. Government spent more on research than ever before—about $550 million, or 2.3% of sales. This percentage was substantially higher in the case of producers of industrial chemicals, plastics, fibres and pharmaceuticals. Investments for research are expected to increase, and the total for chemicals is likely to approach $600 million in 1959.

A favourable balance of trade is still maintained in chemicals and allied products. Exports, chiefly alkalis, fertilisers, pesticides, plastics materials, pharmaceuticals and specialities have held up well, it is reported, but are expected to decrease. While no overall pattern is seen as yet, the exports of pharmaceuticals, some 25% of the output of many individual companies, are expected to lessen as U.S. companies continue to set up plants or external facilities overseas. The rise of the European Economic Community and the British proposed 'Outer' Free Trade Area are expected to sooner or later reduce U.S. exports of other chemicals as well as to Western Europe.

Production of synthetic rubbers, plastics and fibres is expected to set records this year in the U.S. Synthetic rubber in the first six months of this year was 26% ahead of 1958; plastics were 23% better and synthetic fibres, 15% ahead, and the forecast for 1960 is that sales in these products will equal those of 1959, or may be a little better.

This year plastics production may reach 5.6 billion lb., it is estimated, 23% better than in 1958. Polythene is now the number one plastics material—production may reach 1.1 to 1.2 billion lb. this year, a 34% increase over 1958. Vinyls and vinyl copolymers are not far behind and the styrene resins may well reach the billion lb. mark in 1960. The newer plastics, polypropylene, nylon, fluorocarbons and polyformaldehyde are expected to make sharp gains, too. Overcapacity exists, however, in plastics, i.e., low-pressure polythene and epoxy resins.

Among the synthetic rubbers, SBR (styrene-butadiene rubber) is leading production. Output this year is expected to reach one million long tons, about 22% above 1958. Neoprene rubber is likely to reach a record level of 120,000 long tons, nitrile rubber could reach 40,000 long tons and butyl possibly 68,000 long tons. A strike threatens the industry, so producers may increase production to stock up customers.

U.S. textile industry is running at its highest level with mill output up almost 20% above 1958. At the present level, synthetic fibre output could finish the year 15% above the 1958 level. Polyamides (nylon), acrylics (e.g., Orlon) and polyesters (e.g., Dacron) are the fastest growing synthetics. Producers are operating at roughly 75 to 80% capacity and new plant construction will place U.S. synthetic fibres capacity close to the 2.5 billion lb. mark by 1960.

I.C.I. Raise Ethylene Output to 110,000 Tons

New Features Include Gas Generators and Demethanisation Process

THIRD olefin plant at I.C.I.'s Wilton Works, brought on stream recently, has raised capacity by 60%, making a current total output of 110,000 tons of ethylene a year. Plans to raise this figure to 140,000 tons by additions and modifications to the three plants are being considered. The new plant, engineered by Kelloggs, also gives nearly 100% pure methane—a new product for Wilton—and eliminates a costly stage of refrigeration.

The new plant, capable of handling nearly 125,000 tons a year of feedstock, comes into operation 10 years after the start-up of Wilton Works by Imperial Chemical Industries Ltd. Since 1949 the company has spent more than £100 million at Wilton, half of that sum since January 1946. Of the 2,000-acre site, only 600 acres have been developed. The Wilton olefin works and the associated I.C.I. plants on Tees-side now form the largest petrochemical venture outside the U.S. and the largest anywhere based on liquid feedstocks.

Combined feedstock consumption of the three olefin plants is now between 550,000 and 600,000 tons per year of light naphtha. Total olefin production is 230,000 tons a year. Ninety per cent of the ethylene produced is used by I.C.I. to produce Alkathene polythene, the remaining 10% going to ethylene oxide production. About a quarter of the output is in the form of high grade premium petrol which is sold to the oil companies: the production of 75 million gall. a year represents the optimum figure. Methane is not a major product and with 'tail gas' is piped to Billingham for conversion to hydrogen cyanide and hydrogen and carbon monoxide.

The large-scale extension to capacity by the third unit calls for an increase in normal process staff of 13 men per shift, who have 13,000 h.p. working for them. The new project utilises six miles of process piping above ground, 13 miles of electrical wiring, 11 miles of air signal piping, 1,700 tons of structural steel, 5,400 tons of pipes, valves and fittings and 25,000 X-ray photographs taken on pipe welds alone.

The No. 3 plant uses essentially the same processes as those operated since 1951 by I.C.I. for ethylene production at Wilton. Like the earlier plants, it was designed by Kellogg in close collaboration with I.C.I. staff; it was constructed by Kellogg International Corporation to I.C.I.'s order. Kellogg's built the second olefin plant, while the first was constructed by I.C.I.'s own engineering department.

The plant is broadly divided into two sections: the pyrolysis section which converts feedstock into a mixture of gases and crude motor spirit and the product separation and purification section. As in the two earlier olefin plants, temperatures range between 2,000°F and −200°F. Among improvements incorporated in the third unit is a unique engineering feature —said to be novel to any large production plant in the world. This is a battery of 15 free piston gas generators which drive the turbines for the centrifugal gas compressors. Another new feature is the demethanisation process that produces the almost completely pure methane.

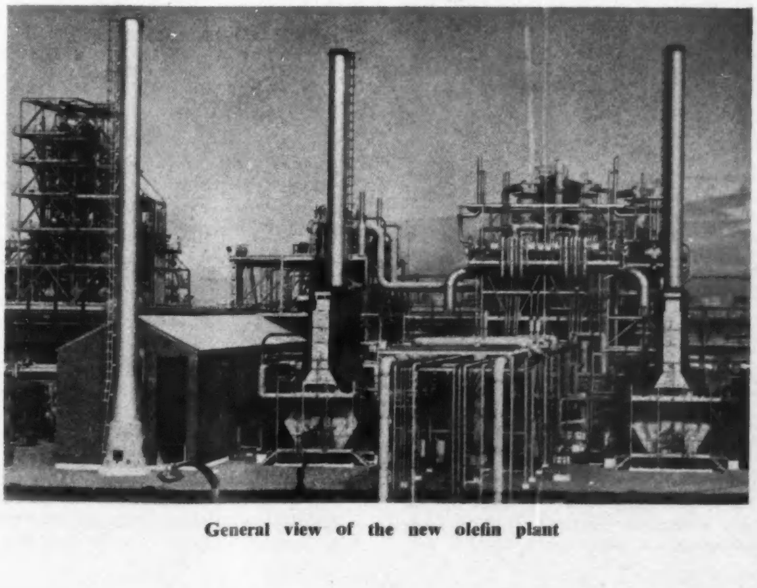
Cracking at low partial pressures and low residence times in the reaction zone, so that the maximum proportion of feedstock is converted to gaseous products and that this gas should contain the maximum amount of olefins, in particular, of ethylenes, is achieved in the Kellogg method of pyrolysis in which most of the heat of pyrolysis is supplied by mixing hot hydrocarbon vapour with steam at a still higher temperature: the major part of the pyrolysis then occurs in a length of internally insulated pipe (the soaker), which leads to the quench devices. Here the reaction is 'frozen' after a contact time of the order of only one second. This pyrolysis arrangement enables high pyrolysis temperatures to be achieved without risk of troubles through coke formation. Also, gasoline of high octane rating can be separated from the liquid products of pyrolysis. A further advantage of the steam pyrolysis method is that it is possible to vary the ratio of steam to hydrocarbon and thereby obtain a degree of flexibility in product distribution, in particular in the ratio of production of ethylene to propylene.

No. 3 Olefin Plant

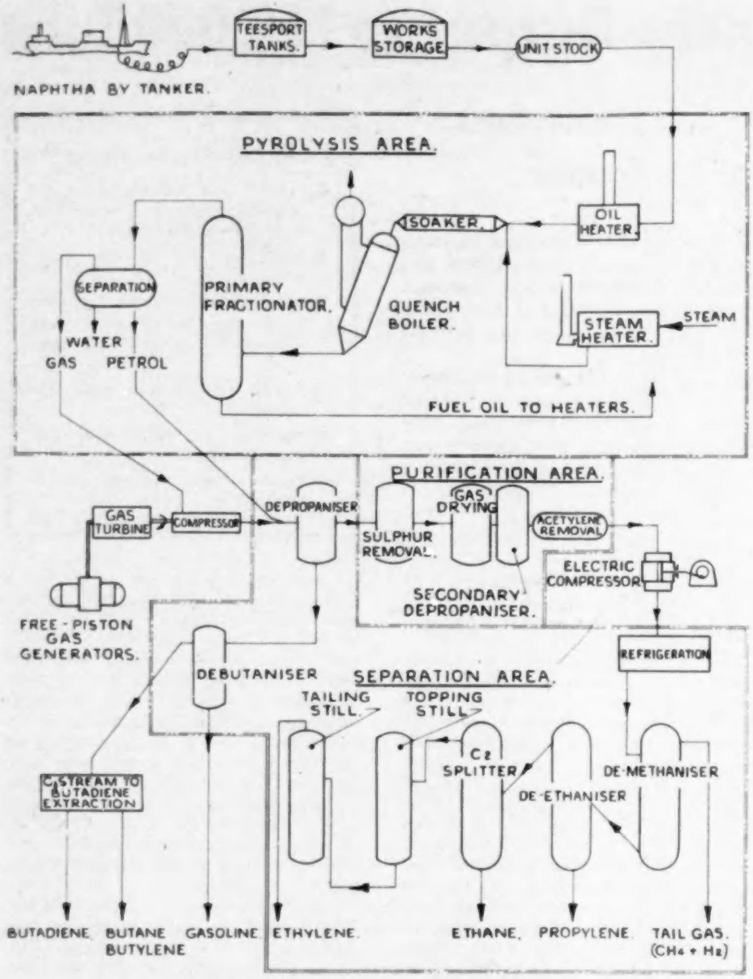
- **Special and entirely novel engineering feature—a battery of free piston gas generators.**
- **Extensive use of gas compressors.**
- **New demethanisation process which gives nearly 100% pure methane—a new Wilton product.**
- **Costly refrigeration stage eliminated.**
- **Operates on more than one type of distillate.**
- **Produces ethylene and propylene of 95% purity.**

Choice of feedstock. So far as Wilton is concerned considerations of economics and availability have restricted the choice of feedstock to a light naphtha. Light distillate 2, as the naphtha at present used is called, is obtained as a distillate derived from paraffinic crude oils, and is essentially a mixture of hydrocarbons in the C_4 to C_9 range. The plant has been designed, however, to operate with more than one type of light distillate, so that a desirable degree of flexibility obtains *vis-a-vis* the international oil industry. At the present time the three plants are consuming between 550,000 and 600,000 tons per year of light naphtha.

Primary plant. No. 3 olefin plant produces ethylene and propylene of high purity: methane; ethane, 'tail gas' consisting of hydrogen and methane; butylenes plus butadiene; gasoline of high octane number; and fuel oil. Because of the high temperatures achievable in pyrolysis and the low partial pressure of hydrocarbon, the ethylene is produced at relatively high concentration, and at a



General view of the new olefin plant



Diagrammatic flow sheet of No. 3 olefin plant

high ratio to ethane. Also, propylene and butadiene are produced in high proportion to propane and other C_4 hydrocarbons, respectively.

The plant. Naphtha feedstock is unloaded from tankers at the Tees Conservancy Commission oil jetty at Teesport and pumped by pipeline to storage in the Olefin Works, from which it is supplied to the pyrolysis sections of the three olefine plants.

The pyrolysis section of No. 3 olefin plant consists of three independent parallel systems, each with its separate tubular oil heater, tubular steam superheater, soaker line and quench boiler. In the latter, 250 p.s.i.g. steam is generated as the reaction is quenched. Independence of each system provides valuable flexibility in regulating pyrolysis conditions at different rates of naphtha feed.

Products of pyrolysis then enter the primary fractionator where the small amount of heavy polymeric oil is separated from the gas and crude petrol and used subsequently as fuel oil. The steam is also condensed at this stage and separated.

Gas and crude petrol proceed to the gas separation section. This is subdivided into a compression unit for process gas and refrigeration purposes; a purification unit where hydrogen sulphide, water, and acetylene are removed from compressed process gas; a warm fractionation system where petrol and butylenes plus butadiene are separated; and finally a train of fractionating columns operating at low temperature in which the remaining light hydrocarbon products are separated.

The free piston gas generator generates hot gas (450°C) at pressure (45 p.s.i.g.). The energy in this gas is expanded in gas expansion turbines to produce shaft power. Basically, the generator is an opposed piston two-stroke diesel cylinder, very highly supercharged (50 p.s.i.g.) which exhausts to a pressure of 40-45 p.s.i.g. This exhaust is the 'gas' which is fed to turbines for conversion into shaft power. The object of using this particular combination of power generators and compressors was to provide a compression plant of high efficiency at a reasonable cost.

Purification of the compressed gas for this plant is on the same general lines as for its predecessors. Hydrogen sulphide is removed by caustic soda scrubbing, the water content of the gas is reduced to less than 0.03 gm./M³ in gas driers employing activated alumina dessicant and a small non-commercial quantity of acetylene is removed by hydrogenation over a catalyst developed by I.C.I.

Product streams resulting from the warm fractionation unit are butylenes/butadiene and crude debutanised petrol. The butylenes/butadiene stream is caustic washed before transfer to consuming plants, and the petrol is transferred to the gasoline treatment plant where it is treated in combination with the petrol streams from the other two plants.

Separation of the methane, ethylene, propylene and ethane from the purified gases is the most costly and difficult step in the whole plant process, and many variants were considered before the actual process was decided. As in the other two olefin plants, separation is achieved by low temperature refrigeration and fractional distillation under medium pressures, but certain modifications are incorporated. For the third plant, refrigeration is provided by a propylene compression system and by a two-stage ethylene compression system in cascade with it. Finally, in order to reach the lowest temperature required for separation of methane and lighter gas, instead of a further stage of refrigeration compression, the methane product is let down in pressure and evaporated.

Automatic control. Although some 150 persons are employed overall, No. 3 olefin plant itself is operated on four shifts, each of 13 people. Numbers are governed more by strict considerations of safety than for operational necessity, but even so, an extremely high tonnage output per man is achieved.

In the three olefin plants, there are altogether 36 continuous and fully automatic analysis instruments transmitting their readings to recorders in the control rooms. Non-dispersive infra-red spectrometers of British and American manufacture are used extensively for the analysis of simple mixtures of light hydrocarbons. For more complex compositions and low concentrations, a chromatograph or an instrument employing chemical analysis is used. In addition to automatic analysers, a considerable staff is engaged in the laboratory on analysis concerned with control of the unit and the checking of product purities.

So far as safety is concerned, the low temperature fractionation section of No. 3 olefin plant has a fire wall (the other two as well), which surrounds its completely; a blanket of steam can be rapidly laid around it to disperse a gross leakage of hydrocarbon vapours. A further precaution is pressurisation of control rooms to obviate the risk of vapour accumulation within them. No process materials are led into control rooms, opening and closing of valves from the control rooms is done by distant control.

Contractors

Kellogg International Corporation, Kellogg House, 7-10 Chandos Street, London, W.1., were main contractors. Principal sub-contractors included: Associated Electrical Industries, electric lighting fittings; Allen West & Co. Ltd., Brighton, 7, starters; Alley & MacLellan Ltd., Worcester, valves and compressors; Ashmore, Benson, Pease & Co., Stockton-on-Tees, distillation columns; Babcock & Wilcox Ltd., London, N.W.1., steam heaters;

British Insulated Callenders Cables Ltd., W.C.I., cabled copper tubing; B.K.L. Alloys, Birmingham, 30, stainless steel pipe fittings; Brookhurst Switchgear, Chester, contractors and fusegear; Brush Electrical Engineering Co. Ltd., Loughborough, gas turbines; Burton Delingpole & Co. Ltd., Old Hill, Staffs., pipe flanges and fittings; Carrier Corporation, New York, U.S. (with N.V. Motorenfabriek Thomassen, Holland), compressors.

Chesterfield Tube Co. Ltd., piping; Clark Brothers, London, E.C.2. (with Alley & MacLellan), compressors; Crane Limited, London, E.I., valves; Crosby Valve & Engineering Co. Ltd., Wembley, relief and control valves.

Davenport Engineering Co. Ltd., Bradford (with Holst & Co. Ltd.), cooling towers; Daniel Adamson & Co. Ltd., Dukinfield, Cheshire, vessels; Engineering Appliances Ltd., London, S.W.I., expansion joints; Fisher Governor Co. Ltd., London, S.E.13., instruments and control valves; Foxboro Yoxall Ltd., Redhill, instruments; Free Piston Engine Co. Ltd., Wolverhampton, free piston gas generators and spares; General Electric Company Ltd., London, W.C 2., compensating cable; Harland & Wolff Ltd., Belfast, compressors; Hayward Tyler & Co. Ltd., Luton, pumps; Head Wrightson & Co., Thornaby-on-Tees, heat exchangers; Henry Balfour & Co. Ltd., Leven, vessels; Integra, Leeds & Northrup Ltd., temperature instruments; John Thompson Ltd., Wolverhampton, vessels; Mather & Platt Ltd., Manchester, 10, electric motors; Newalls Insulation Co. Ltd., Washington, Co. Durham, hot and cold insulation; Peter Brotherhood Ltd., Peterborough, compressors.

Redpath, Brown & Co. Ltd., Edinburgh, 7, structural steel; Robert Jenkins & Co. Ltd., Rotherham, tanks, separators; Robert Watson & Co. (Constructional Engineers) Ltd., Bolton, stack, tanks, towers; Societe Industrielle Generale de Mecanique Appliquee, Paris, free piston gas generators; Spencer-Bonecourt-Clarkson Ltd., London, W.C.I, quench boilers; Stewarts & Lloyds Ltd., Glasgow, C.I, piping; Talbot Stead Tube Co. Ltd., Walsall, piping; Weldless Steel Tube Co. Ltd., Wednesfield, piping; Whessoe Limited, Darlington, tanks; W.M.G. (Guildford) Ltd., Guildford, flanges.

I.C.I. Negotiate for U.K. Rights to Make Polypropylene Fibre

NEGOTIATIONS are now taking place on licensing arrangements for the production in the U.K. of polypropylene fibres. I.C.I. are among the companies concerned with these discussions with Montecatini of Milan. This was stated by Mr. D. M. Bell, managing director of I.C.I.'s Heavy Organic Chemicals Division, at a Press conference held at Wilton Works on Tuesday. He thought the negotiations should be settled within a few months.

Montecatini were, he said, confident that the future for polypropylene fibres was bright, but did not look on it as a competitor to Terylene, which they produced under licence from I.C.I.

So far as the polymer was concerned, there were many applications in the moulding field, where Propathene, I.C.I.'s trade name for polypropylene, would complement rather than compete with polythene. The different properties of polypropylene, including heat resistance and low density, should find new markets. For extrusion, particularly for some applications in the sub-zero range, polythene had the edge on polypropylene; but the latter would be better for some chemical applications. Much experimental work remained to be done before the film market could be fully exploited.

Construction has started on I.C.I.'s 10,000 tons per year polypropylene plant on the Wilton site. It is hoped that this plant will be completed in 1960.

The polypropylene plant is being built for I.C.I. Plastics Division, which with other divisions has plants at Wilton Works. At present, all ethylene surplus to polythene needs is converted to ethylene oxide by the chlorohydrin route. Plans for extensions are at an advanced stage and a direct oxidation method may be used. Plans are in hand to make propylene oxide and propylene on a large scale, possibly on the old ethylene oxide unit. With the ethylene glycol they are used in producing polyester and polyether resins, notably Dyestuffs Division's polyurethane range.

By-products from manufacture of ethylene oxide and glycol, ethylene dichloride, dichlorodiethyl ether, di- and polyglycols are sold for widely differing applications including extractive solvents in butadiene purification, insecticides, humectants and plasticisers as well as for chemical intermediates.

The *p*-xylene plant was installed to meet Fibre Division's requirements of *p*-xylene which, with ethylene glycol, is an important starting material in making Terylene. The plant not only extracts *p*-xylene from the feed, but also isomerises *o*- and *m*-xylenes thereby giving a very much higher yield per ton of mixed xylenes than is obtained by other producers, I.C.I. claim.

Synthetic Phenol Plant. At the synthetic phenol plant, monochlorobenzene, delivered by pipeline from the adjacent Cassel Works of General Chemicals Division, is the starting material. Alterations are in progress, I.C.I. report, which should increase the present output of about 15,000 tons per year to 20,000 tons per year. A large proportion of phenol is used within the company for the manufacture of alkylated phenols by Heavy Organic Chemicals Division and phenol-formaldehyde resins by Plastics Division; the remainder is sold to outside customers.

By-products of the process are *o*-phenyl phenol and its sodium salt, *p*-phenyl phenol and diphenyl oxide, which are sold for use as such products as fungicides, paint varnishes and enamels, heat transfer media and perfumes.

Pimary fractionator column

Alkyl Tar Acids Plant. This consists of a number of units with capacities ranging from a few hundred to more than 10,000 tons per year. Raw materials include synthetic phenol from the previous plant mentioned, isobutene from Olefin Works, purchased cresols, xylenols, di-isobutene, heptenes and nonenes. Products made are *p*-tertiary butyl phenol (Terbutol), *p*-octyl phenol, *p*-nonyl phenol, *p*-heptyl phenol, petrol anti-oxidants, di-tertiary-butyl-*p*-cresol (Topanol O), 2:4-dimethyl-6-tertiary butyl phenol (Topanol A) and NN'di-secondary butyl *p*-phenylene diamine (Topanol M).

Carbonylation Plant. This has three units in operation, the third having started up in July. It incorporates much of the equipment that was released when creosote hydrogenation ceased about nine months earlier. Capacity varies with the products being made; it is currently about 60,000 tons per year which is said to make the plant "easily the largest of its type in the world". Plans are in hand to raise carbonylation capacity still further and development work is being done on new products, particularly higher alcohols for making synthetic detergents, which may be added to the present range.

The process used is basically the German OXO process, considerably modified and improved by I.C.I.'s own research since the war.

Alkylamines Plant. There are two units for making mono-, di-, and tri-methylamines and one unit for mono-, di-, and tri-ethylamines. Capacity of each unit depends on customer requirements; the combined total is between 2,000 and 3,000 tons a year. Raw materials, are ammonia and methanol supplied by pipeline from Billingham Division, and purchased ethanol.

Isopropanol and Acetone. The isopropanol azeotrope plant has a capacity approaching 45,000 tons a year. It hydrates propylene, received by pipeline from Olefin Works, by a process discovered by I.C.I. to give the azeotrope of isopropanol and water. Most of this azeotrope is converted into acetone, the hydrogen produced going to the carbonylation plant. Much of the acetone is piped to Cassel Works for making methyl methacrylate monomer and the remainder is used as solvent and intermediate inside and outside I.C.I. at home and abroad. Azeotrope not converted to acetone is refined to give pure isopropanol, which is sold as solvent, as a de-icing additive for petrol and as an intermediate. Nobel Division make it into isopropyl nitrate.

The Heavy Organic Chemicals division now has some 40 products on the selling range and its directors say that it has many more in the development stage. Sales are reported to be rising steadily, about 50% being to other I.C.I. divisions, 40% to other U.K. customers, and 10% to the export market. The division has set up bulk-storage depots in Belgium, Holland and Switzerland, and is making bulk shipments to Sweden, Italy, the U.S., Canada, Australia and South Africa.

DISTILLATES

★ **Faced** with the possibility of widespread shutdown by the end of this month if there is no substantial rainfall to augment depleted reservoirs, I.C.I. Billingham Division have been making drastic efforts to cut water consumption. I learn from Mr. W. J. V. Ward, division chairman, that one of the principal products—sulphate of ammonia—can be made at Prudhoe where the water supply situation is not so critical.

If supplies have to be restricted at the end of the month Mr. Ward declares: "We shall certainly not be able to maintain our present level of production. It is too early to say in detail what steps we shall be forced to take". If output has to be limited for any substantial period, steps will be taken to notify everyone likely to be concerned as early as possible.

One of the largest users in the area, I.C.I. Billingham are making every effort to increase the amount of condensation for re-use, so far as steam raising is concerned, and to avoid blow-off and leakage of steam. In addition a great deal of river water is now being used for cooling instead of Tees Valley water. Another economy measure is to divert water that has been used in one works, but for process reasons cannot be used there again. This is being done between Cassel and Nylon Works.

★ **Developments** in solid rocket propellants were discussed by G. H. S. Young at a Chemistry Section session during the British Association annual meeting last week. He said that the bigger present-day rockets were leading scientists to look at casting processes, which would be more convenient than pressing or extrusion. Work is now going on with a cast double base propellant that resembles extruded cordite in chemical and physical properties, and on composite propellants based on synthetic rubbers, of which polyurethane rubber appears to have many advantages.

Higher performance also calls for the addition of new ingredients such as light metals, and a search for new combustion systems possibly based on fluorine chemistry. To enable solid propellant rockets to be used in the larger missiles, methods of thrust and thrust determination will have to be developed.

★ **From** talk of solid rocket fuels at York to a practical demonstration of a liquid fuel at Farnborough. Last week I saw Laporte Chemicals demonstrate decomposition of their test peroxide in a miniature rocket unit. Purpose of the display was to show on a small scale the startling potential of H.T.P. as a "safe and compact source of power."

Visitors saw H.T.P. being forced under pressure on to a silver catalyst, decomposed into superheated steam and oxygen which then expands through a jet, the thrust obtained being indicated. H.T.P. is pressurised by 600 p.s.i. nitrogen and the valves are servo-operated for pressurising and venting the H.T.P. tank, while an on-off valve is electrically operated. The decomposer and nozzle unit is one of the helicopter tip jet units made by D. Napier and Son, Luton.

Laporte, like Albright and Wilson, who showed their Kanigen process, British Oxygen Co. Ltd., I.C.I. with displays of titanium, paint and plastics, including polypropylene and p.t.f.e., and other chemical firms, exhibit at the Farnborough Air Display largely for prestige purposes. This, of course, is an expensive way of 'showing the flag', but occasionally a trade inquiry crops up and leads to a valuable new customer.

★ **At last** the U.S. Department of Commerce has approved a large order destined for the U.S.S.R. A plastics pipe plant costing more than \$1 million will soon be en route to the U.S.S.R. from Omni Products Corporation, a New York exporting company. Tachmasimport, the Soviet importing concern, will pay cash for the plant in U.S. dollars.

The contract covers a complete plant, including extruders, grinders and dies; raw materials, however, are not included. The U.S.S.R. plans to use both polythene and polyvinyl chloride pipe with the plant, ostensibly for use in irrigation. Capacity will be 10,000 tons a year, this being comparable to the largest such plants in the U.S. Various components of the plant will be bought by Omni from U.S. companies. Delivery will start late this year and will finish by early 1960. The order was received, I learn, when Soviet plastics officials visited the Chicago international plastics exposition in late 1958.

★ **Reviewing** the astounding post-war growth of the petrochemical industry in Europe, Mr. L. H. Williams, managing director of Shell Chemicals Ltd., sees an equally bright future. There are, he says, relatively few organic chemicals that could not to a large extent be based on petroleum. As only a proportionately smaller part of the future increases in needs for organics can be supplied by non-petroleum raw materials on grounds of economics and availability, future growth must be based increasingly on petroleum and natural gas.

Writing in *The Financial Times* Annual Review of British Industry, he shows that the rate of growth in Britain has far exceeded that of the U.S., the annual growth rates over the period 1948-57 having been 51% per annum for the U.K. and 14.2% for the U.S. He also gives the following figures comparing growth rates in West Europe and the U.S.

	Years 1948-57 % increase p.a. U.S.	Europe
Industrial production	3.8	7.4
Chemical industry	5.8	10.9
Petrochemicals	14.2	54.1

Discussing the share represented by petrochemicals of the organic chemical industry as a whole, Mr. Williams roughly estimates that for the U.K. this was 36% in 1954, rising to about nearly 50% by the end of this year. Despite this vast expansion, petrochemicals production still only accounts for 1½-2% of the free world crude oil output of more than 900 million tons a year.

★ **Bringing** on stream a third olefin unit has given Imperial Chemical Industries the biggest petrochemical facility outside the U.S. In the 10 years since Lord McGowan opened the works, I.C.I. have invested nearly £120 million at Wilton.

My visit to the works on Tuesday gave me an insight into what for I.C.I. has been an unusual but extremely successful site management experiment. Each of the divisions with plants at Wilton are fairly autonomous so far as production is concerned. The site is administered by Wilton Council, which comprises six local directors and the chairmen of the divisions which have plants on the site.

Wilton Council is responsible for providing the services that are used by the various plants, and controls such factors as safety and effluent disposal since these are matters of site policy.

Apart from major extensions to the Terylene plant now in hand, the next facility will be for polypropylene. I saw that construction work for this large-scale project is under way. I.C.I.'s agreement covers production of the polymer only, but Mr. D. M. Bell, managing director of the Heavy Organic Chemicals Division told me that negotiations are in hand for the U.K. rights to produce the fibre. Since Montecatini are licensed to produce I.C.I.'s polyester fibre, this should put them in the running for a *quid pro quo*.

★ **The** first systemic to be marketed in the U.K. to combat the warble fly, which causes large-scale losses each year to the leather, milk and meat industries, represents a major research break-through (see page 343). Dr. W. E. Ripper's enthusiasm for this new Dow product inspired the following irreverence for which I make no apologies:

Warble, warble, little fly;
This will do you in the eye.
Systemics now have won the battle:
No more warble fly in cattle.

Alembic

NEW DOW SYSTEMIC COMPOUND FOR WARBLE FLY

NOW available in the U.K. is a new chemical compound—Etrolene, that promises to be of great value in eradicating warble fly pest of cattle. Larvae of the fly live in the animal for 7 to 9 months of the year causing lumps or swellings in the back which lead to damage and puncturing of the hides. Losses in this country due to warble fly infestation are estimated at £3 million a year, while O.E.E.C. estimates the loss in Europe to be £27.5 million.

The new drug, trade name Etrolene, marketed by Dow Agrochemicals Ltd., London, is chemically o, o-dimethyl 0-2, 4, 5-trichlorophenyl phosphorothioate. It was discovered by Dow Chemical Co., U.S.

Dr. W. E. Ripper, managing director of Dow Agrochemicals, announcing the marketing of the drug, described Etrolene as a "notable breakthrough" for it is the first systemic compound to be discovered for treatment of this type of infestation and to be marketed in the U.K. Dr. Ripper also reported that for experimental use, there is a second compound Ruelene — 4-*tert*-butyl-2-chlorophenyl methyl methylphosphoramidate, which is available as a spray. This also has a systemic action. Dow Agrochemical hope to market Ruelene next year.

Etrolene has proved effective in the U.S. and Canada where over 4 million cattle have been treated and by experiments involving 650 animals in Great Britain over the last year. Results of these experiments have been returned to the Ministry of Agriculture's Central Veterinary laboratory at Weybridge. Many of the herds involved have been those of agricultural research institutes and colleges in this country.

Drench Treatment

Administered as a drench or a bolus, between 1 September and the end of November, when the larvae in the animals are still small, before they reach the backs of the animals and before they have done any damage to meat or hides, the action of Etrolene has proved effective and non-toxic in the dosage recommended. The mode of action of the drug is that it enters the blood stream from the gastro-intestinal tract and hence contacts the larvae in the tissues.

Dosage in all cases is according to liveweight. Used as a drench, 1 lb. of wettable powder is dissolved in 1 quart of water and dosed at the rate of 3 fluid oz. per 300 lb. liveweight. With Ruelene used as a systemic spray, a pressure of 150 p.s.i. is needed (i.e. an ordinary orchard sprayer). Trials with Ruelene in the form of an injection are proceeding. Preliminary studies have also shown that Ruelene has anthelmintic value when administered in a single oral treatment. Most internal parasitic warms can be removed. An exception is lung worm.

The order of toxicity of Etrolene is described as "very low" and it is completely free from side reactions provided it is given at the right time. It is seven times as safe as DDT and about equal in toxicity to Malathion. The LD_{50} to rats is 1,740 mg./kg. A high percentage of a therapeutic dose is metabolised to water-soluble degradation products which are quickly excreted (approximately 50% of the total dose within 24-36 hours after treatment). Using a radioactive drug, the peak of radioactivity appeared in the blood between 8 to 12 hours after treatment with levels ranging from 12 to 25 p.p.m. Approximately 7% of the radioactive drug appeared in the faeces. Radioassay of various tissues of treated animals showed complete degration of Etrolene to phosphoric acid and re-synthesis into tissue proteins.

Officially accepted by the Ministry of Agriculture and Fisheries, the only restrictions to use of the drug are that when given to beef cattle, 60 days should elapse after treatment before slaughter and lactating cows should not be given Etrolene.

Cost of treatment with this new systemic is 5s to 10s per head yearly (only one dose a year is required) depending on the bodyweight of the animal.

British Glues Introduce Edible Protein from Vegetable Sources

PRODUCTION of edible protein from vegetable sources has resulted from research begun in 1935 by Dr. G. R. Tristram, now Reader in Biochemistry at St. Andrews University, and seven years of development research by Mr. I. H. Chayen, assistant managing director of British Glues and Chemicals Ltd, Imperial House, 15-19 Kingsway, London W.C.2.

The company believes that the products, derived from grass, leaves, nuts and other vegetable matter, hold the answer to the growing problem of overpopulation and undernutrition.

At British Glues' Bermondsey factory, a pilot plant is handling a ton of raw material an hour, some 4½ cwt. of protein being obtainable from peanuts and about ½ cwt. from grass. The product is known as impulse process protein because of the method used to separate the protein from vegetable matter. It relies on impulses generated by a mechanical beater in a liquid stream for breaking down the cell walls of plants and releasing the protein. The impulses are not sufficient to emulsify the cell contents and they therefore separate readily. Mr. Chayen began his research by subjecting cellular tissues of a bone or pieces of raw fat suspended in liquid to a series of shock waves of sufficient intensity to cause the cells to burst open. Applying the method to vegetable material has taken five years.

During the demonstration of the prototype plant last week, ordinary peanuts were processed, the products obtained being, peanut oil, peanut meal and peanut protein with a very low fat content. The carbohydrate waste obtained from processing peanuts when mixed with soft fibrous waste can be used as cattle feed. Sale of this product could equal the cost of producing the protein. Fibre obtained after treating grass is expected to find application in the manufacture of cardboard and fibreboard.

Dr. Tristram states that the food value of the new protein would rely upon careful blending of it with non-processed vegetable or animal material to ensure that vitamins, mineral substances, etc., should be present. He estimates the new process to be some 10 times more efficient than cattle for converting plant material into edible protein. Vitamin A, in the form of carotene, and vitamin E were only two of the valuable by-products obtainable from the chlorophyll syrup left over after treatment of grass.

Cost of establishing a plant, it is estimated, would be something under £1 a head of the population for whom it was designed assuming a demand of 2 oz. per day per person of blended protein. In terms of production this would mean a cost of about 2d a week to provide any individual with all the protein needed for healthy physical existence. The powder protein, made into capsules with vitamins and other concentrates could form first rations in time of famine or be used where there is widespread malnutrition. It is hoped that within 12 months trial human consumption of plant protein produced by the new system will be done.

Not much has been said about marketing arrangements. The United Nations have shown an interest, British Glue report, and Sir Miles Thomas, deputy chairman of the company, indicates that it plans to licence the process and take a royalty. At the demonstration, Sir Miles said that great interest had already been shown by Indian authorities and that the process was "an economically attractive proposition". He also thought that there would be important Commonwealth applications for the process.

New Latex Plant for I.S.R. at Hythe

CONSTRUCTION has started on new plant for International Synthetic Rubber Co. at Hythe, Southampton, which will produce general purpose synthetic rubber latex. The plant will be an extension of the existing £6 million factory, which came on stream less than a year ago.

The new plant has been designed to produce 2½ million gallons of rubber latex a year for use in foam rubber articles. Capacity of the new extension will add the equivalent of 10% to the 70,000-ton capacity of the main plant, where bulk manufacture of general purpose synthetic rubber now takes place.

U.S. INORGANIC CHEMICALS RECOVER FROM 1958 SETBACKS

NEW sulphuric acid facilities totalling about 1 million tons were installed during 1958 in the U.S., mainly west of the Mississippi to meet requirements for fertiliser, uranium processing, metals, petroleum, and chemicals. In the eastern states plants installed have been mainly for reprocessing spent acid.

Total sulphuric acid production is reported to have recovered this year from the decline in 1957 and 1958 and may set a record of over 17 million tons (*Chem. and Eng. News*, 1959, **37**, No. 36, 116). If the steel strike is prolonged, however, an adverse effect would be noted.

Sulphur consumption in the U.S. to date has been at a high level. Frasch sulphur output, however, in the first few months of the year was at the lowest rate in more than 12 years. Producers have evidently been drawing on stocks. It is expected that by the end of the year Frasch sulphur output will speed up. Production of recovered sulphur is growing. It is reported, also, that a definite trend seems to be developing in favour of low cost elemental sulphur.

Chlorine and Alkalis. The favourable output of chlorine at the end of 1958 has been carried into 1959, with prospects of approaching the 1957 peak.

Since the peak year 1956 sodium metal output has been dropping and this fall will continue this year. Low level of demand for titanium and zirconium has reduced demand and the U.S. Bureau of Mines reports less use of sodium in tetraethyl lead, because of smaller amounts of TEL required in motor fuel produced by newly built catalytic reforming equipment.

Sodium Carbonate

Output trend for sodium carbonate in the first half of this year points to an annual figure approximating that of 1957. In the case of sodium hydroxide the U.S. Bureau of Census has stopped publishing data on output by process. Latest data were for the first seven months of 1958, during which 2,025,607 tons were made electrolytically and 259,550 tons by the lime soda process. Lime soda output enjoyed a slight boom because of the low output of electrolytic caustic, tied to chlorine production which slumped in early 1958.

The 1959 prospect in terms of total caustic is for a fine year, possibly even of a record.

Potassium hydroxide output has been running at the best levels since 1957. If it continues, an annual total close to the 1956 record year may result. Interest remains in the possibility of growth in the use of liquid detergents using potassium rather than sodium phosphates as builders. There is little evidence of this so far, however.

Early 1959 quicklime sales, data from the U.S. Bureau of Mines show, have been at a much higher rate.

Lime Production
(in thousands of short tons)

	Jan.-April 1958 (preliminary)	1958 (preliminary)	1959
Quick lime ...	2,481	5,873	7,112
Hydrated lime ...	631	1,875	1,852
Total ...	3,112	7,748	8,964

Fertilisers. Production of most fertiliser materials has been at a high level this year, as a result of an exceptionally heavy spring demand. U.S. Department of Agriculture estimates that total net supply of nitrogen available for consumption in 1958-59 is expected to be up—about 2.6 million tons. Approximately 62% of fertiliser nitrogen was used as individual direct application materials and 38% was used in the form of mixtures; specific forms showing gains for direct application have been anhydrous ammonia, nitrogen solutions, ammonium sulphate and ammonium phosphates.

Use of liquid phosphoric acid directly in fertiliser mixing has gained importance. U.S. Department of Agriculture estimates phosphoric acid (both furnace and wet process) consumed for liquid fertiliser mixtures, high-analysis solid mixtures, and for direct application may have reached in the 1958-59 agricultural year, 200,000 tons P_2O_5.

Preliminary data for potash for 1958-59 reveal that consumption, along with the other two major plant foods, is up substantially.

Phosphorus output in the early months of 1959 stood 13% ahead of the low output in early 1958, and nearly 2% higher than that in the closing months of last year. Total phosphoric acid production was also at record levels early this year, about 7% ahead of the comparable 1958 period and about 3% higher than the closing months of 1958. Since 80% of phosphorus output is consumed annually in phosphoric acid, the acid market is the key to growth prospects. Competition from producers making acid by the wet process is expected, however. It is also stated that demand for acid for consumers other than fertiliser is strong.

Johnson Matthey Now Produce All Rare Earth Metals

SUCCESSFUL production of all the rare earth metals has been achieved by Johnson Matthey and Co. Ltd., Hatton Garden, London E.C.

The rare earth elements or lanthanons comprise the 15 elements from lanthanum (atomic number 57) to lutetium (71). Scandium (21) and yttrium (39), the first two members of the same subgroup in the periodic table, are similar chemically and in their atomic structure. Element 61, promethium, does not occur naturally, but one of its isotopes has been isolated from the products of nuclear fission.

Together these closely related elements, with their compounds, form a hitherto little known but potentially valuable range of materials.

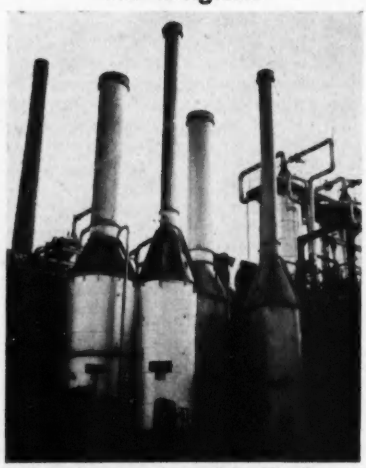
For some years active research on the rare earths has been carried out by Johnson Matthey, and supplies of the rare earths in their normal form as oxides have been available in several grades of purity. Improved techniques for the production of the metallic elements have now been brought to fruition, and all the 14 naturally occurring elements, together with the closely related elements scandium and yttrium, are now available in a variety of forms.

The metals are reduced from their fluorides with lithium, calcium or lanthanum in tantalum crucibles in an atmosphere of argon, and are then remelted in vacuum. Impurities are held at a very low level and in some cases the purity is higher than has hitherto been achieved.

Lanthanum, cerium, praseodymium and neodymium oxidise readily at room temperature and must be preserved in air-tight containers, but all the other metals, except europium, acquire no more than a superficial tarnish on prolonged exposure to the air at room temperature. Europium is highly reactive and therefore difficult to preserve and handle as metal.

All the sixteen metals have been remelted into ingots or rods. Lanthanum, cerium, neodymium, praseodymium, yttrium and gadolinium have been successfully extruded.

Power-Gas Texaco Unit for Belgium



Designed and engineered by The Power-Gas Corporation Ltd., Stockton-on-Tees, a Texaco heavy oil gasification unit and high pressure CO conversion plant commenced operation earlier this year at the factory of Societe Carbochimique S.A., Tertre, Belgium. This picture shows condensate and oil/steam mixture preheaters

PROGRESS WITH NEW B.S. FOR CHEMICAL INDUSTRY

ALTHOUGH the number of British Standards published during the past year decreased compared with the previous 12 months there was a sharp increase in new projects begun in the chemical division—48 compared with 16.

Details are given in the report of the British Standards Institution for 1958-59, published from 2 Park Street, London W.1, at 7s 6d.

Work is continuing on standards for synthetic resin adhesives. Trials of various test methods to assess the efficiency of polyvinyl acetate adhesives for wood are being carried out.

Disinfectant fluids. A satisfactory staining test has been developed and will be included, as an optional requirement, in an amendment to B.S. 2462 'Black and white disinfectant fluids.' This will be issued when revised definitions of black and white fluids in B.S. 2462 proposed by the British Disinfectant Manufacturers' Association have been considered.

Tar acids in disinfectant fluids. The method of determining tar acids (phenols) in black and white disinfectant fluids, proposed by the B.D.M.A. is designed for fluids containing mainly coal-tar acids and is not necessarily applicable if chlorinated phenols are present. For practical purposes the scope of the proposed British Standard therefore depends on the definitions accepted for black and white fluids, and the work of the committee has been in abeyance pending a decision on this point by the committee responsible for B.S. 2462 (*see above*).

Disinfectant activity of quaternary ammonium compounds. Preliminary consideration of the suspension test structure proposed by the B.D.M.A. has been completed and a revised draft is in preparation.

Colouring matters for use in foodstuffs. Methods of analysis that are generally applicable to permitted coal-tar dyes have been drawn up, and have been circulated for comment together with a draft specification for tartrazine. As soon as certain factors necessary for the application of the methods to particular dyes have been determined, draft specifications for sunset yellow, amaranth, ponceau 4R and carmoisine will be circulated for comment. The guidance of the Ministry of Agriculture, Fisheries and Food has been obtained on the intermediates for which limits should be specified.

Photographic chemicals. Two standards, for metol and hydroquinone (quinol) have now been published, and draft standards are shortly to be circulated for comment covering 1-phenyl-3-pyrazolidone, potassium bromide, potassium metabisulphite, sodium carbonate, sodium sulphite, anhydrous and hydrated, and sodium thiosulphate, anhydrous and hydrated.

Glycerol. In the revision of B.S. 2621-5, Glycerine (glycerol) which is in preparation, the method of determining glycerol will be amended.

Rubber. Further progress has been made in the revision of B.S. 903 (methods of testing vulcanised rubber). A technical committee is being set up to draft a Standard for preparing synthetic rubber for test.

Polythene piping. Rapid headway has been made in the preparation of a draft standard for high-density polythene tube for cold water services but because of disagreement on the sizes to be included a further enquiry has had to be made.

Pressure vessels. Part 1, 'Carbon and low alloy steel,' of B.S. 1500 'Fusion welded pressure vessels for use in the chemical, petroleum and allied industries' was published during the year and work has begun on Parts 2 and 3, 'Austenitic steel pressure vessels' and 'Aluminium alloy pressure vessels.' An amendment to Part 1 has been proposed, the intention of which is to allow higher design stresses to be used by agreement between the manufacturer, purchaser and the inspecting authority and to enable design engineers to take advantage of the latest design data. This would bring British-designed pressure vessels more into line with Continental designs than hitherto with regard to thicknesses.

Pigments. Experimental work is being carried out to ascertain the most reliable methods of test for inclusion in a Standard for test methods for pigments.

WORK IN HAND

In the following list of work in hand the position reached at 31 March 1959 is indicated by figures as follows: 1 work authorised, 2 drafting in hand, 3 draft circulated for comment, 4 comments under review, 5 approved for submission to Industry Standards Committee, 6 approved for publication and with printer. An asterisk denotes new work.

	Stage
Adhesives	
Polyvinyl acetate adhesives for use with wood	2
Synthetic resin adhesives for plywood made from low-density timbers	2
Disinfectants	
Black and white disinfectant fluids (revision of B.S.2462)	1
Disinfectant activity of quaternary ammonium compounds	2
Tar acids in disinfectant fluids	2
Fine and Heavy Chemicals	
*Ammonium chloride	1
Antifreeze	5
Barytes aggregates for concrete and plaster	4
*Calcium chloride	1
Coding of refrigerant chemicals	2
Colouring matters for use in foodstuffs	2, 3
*Desiccants for packages (revision of B.S.2540 and B.S.2541)	3
Diacetin (glyceryl diacetate) (revision of B.S.1594)	2
Methods of testing desiccants for use in dynamic equipment	2
Pentachlorophenol	3
Photographic chemicals:	
1-Phenol-3-pyrazolidone	2
Potassium bromide	2
*Potassium metabisulphite	2
Sodium carbonate	2
Sodium sulphite, anhydrous	2
Sodium sulphite, hydrated	2
Sodium thiosulphate, anhydrous	2
Sodium thiosulphate, hydrated	2
*Sodium chlorate	1
Oils, Fats, Greases and Soaps	
Essential oils	2-4
*Methods of testing (revision of B.S.2073)	1
Glycerine (revision of B.S.2621-5)	2
Methods of test for surface-active agents	2
Vegetable oils (revision of B.S.628 series)	2
Chemical Engineering	
Bricks and tiles (chemically resistant)	4
Gas cylinders:	
Filling ratio of liquefiable gases (revision of B.S.1736)	2
Valve outlets (revision of B.S.341)	2
Metallic finishes:	
*Anodised aluminium (revision of B.S.1701)	2
*Cadmium and zinc electro-plating (revision of B.S.1701)	3
Electroplated coatings of nickel and chromium (revision of B.S.1224)	5
Methods of testing equipment to operate in vacuum	2
Oil-burning equipment (revision of B.S.799)	2
Pressure vessels:	
Glass-lined pressure vessels	1
Fusion-welded for chemical engineering:	
Part 2, Austenitic pressure vessels	2
Part 3, Aluminium alloy pressure vessels	2
Sizes for process vessels for the chemical and allied industries	6
Test methods for powder properties:	
*Flow properties	1
*Green strength	1
Particle sizing—sedimentation	3
Particle sizing—elutriation	3
Particle sizing—microscope	2
Sampling	3
Testing of zinc coating:	
on galvanised wires	3
on fabricated articles and coatings	3
Vitreous enamel finishes, testing of	
acid resistance test	3
chemical shock test	3
Woven wire screens (revision of B.S.481)	2

Chemists to Help Academy of Forensic Science

CHEMISTS will co-operate in a British Academy of Forensic Science which will hold its first meeting in London next year. It will function on similar lines to the well-known American Academy, its object being to advance forensic science in all its aspects 'to the benefit of justice and the law'.

The decision to found the academy was taken at a meeting at the Ciba Foundation for the Promotion of International Co-operation in Medical and Chemical Research on 9 September.

Cyanamid U.K. Plans Discussed in New York

Discussing plans for 1960 in New York with E. G. Hesse (centre), managing director, Cyanamid International, are, l. to r.: O. N. Williams, managing director, Cyanamid of Great Britain; T. J. Woodthorpe, manager, Lederle Laboratories, Gosport; C. G. Killpack, manager, Agricultural Division; and E. G. Walters, manager, U.K. Lederle Division

General Electric's Improved Fuel Cell Uses Plastics Membrane

DESCRIBED as a new, improved form, General Electric's fuel cell consists of a round plastics disc about ½ in. thick and 3 in. in diameter. It uses hydrogen and oxygen, with water as by-product.

Developed by Dr. W. Thomas Grubb and Dr. Leonard W. Niedrach, the hollow interior of the plastics disc is divided into two chambers by a special plastics membrane, which has an electrode in contact with each of its sides. Hydrogen is fed into one chamber, and oxygen into the other (or oxygen in air can be used). At one electrode, the hydrogen molecules break up into electrons and positively charged hydrogens. The electrons travel through an external circuit to the other electrode, thus creating an electric current. The positively charged hydrogen moves through the membrane to the other electrode, where it combines with oxygen and the electrons from the external circuit to form water.

The new device is stated to operate efficiently at room temperature and normal atmospheric pressure. Thermal efficiencies over 60% have been obtained.

Ion Exchange Membrane

The novelty of this fuel cell is the use of an ion exchange membrane as an electrolyte. This has an advantage over aqueous electrolytes, in that the electrolytically conducting ions are 'locked in' and cannot be leached from the cell. These membranes also reject water when they reach saturation, General Electric say, and therefore no difficulty is experienced from dilution effects. These features also continue to simplify the operation of the cell, because they provide built-in controls for maintaining the electrolyte concentration and the water balance. In addition, the electrolyte may be acidic, consisting of a cation exchange resin in its hydrogen form. The use of an acidic electrolyte makes it possible to use gases containing carbon dioxide, for example, air.

In the present device, the hydrogen ion is the charge carrier and the water forms at the oxidant electrode. This is advantageous when the cell is operated on air, since the water can be disposed of by controlled evaporation.

Other features noted for this fuel cell are: the solid polymer electrolyte makes possible very compact cell structure; operation on static heads of gas is possible; no moving parts are involved; and close tolerances are not involved in the construction of the cell.

A number of cells have been operating continuously for from 75 to 100 days, and these tests have not yet been concluded. One cell has operated for more than 100 days, and is still running. Two cells have been operated with their cathodes exposed to the air; one of them is still running after more than 75 days. Portions of these tests have been conducted at current densities of 30ma/cm^2. The cells have been operated mainly on commercially available hydrogen and oxygen.

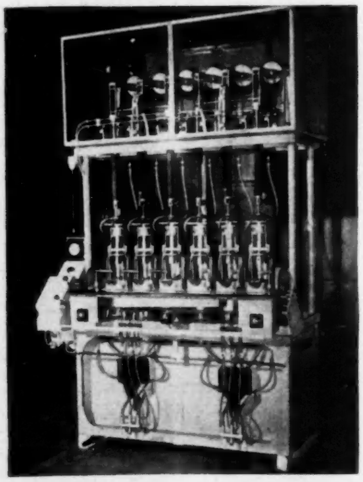
Thinness of the cell itself and the small size of the gas chambers make the performance of the cell in terms of net power per unit weight (or per unit volume) attractive. Power densities of the order of one to two kilowatts per cubic foot have been calculated on the basis of present data.

Although this fuel cell produces low-voltage direct current, its special characteristics are considered likely to fit it for a variety of uses and in particular, speciality applications. Thus military and space vehicle applications might make use of the fuel cell's high reliability, simplicity, portability, light weight and small volume.

A.B.C.M. Annual Dinner

The Association of British Chemical Manufacturers state that the arranging of the General Election for 8 October will not affect arrangements for the association's annual dinner, which will be held as arranged the previous evening, Wednesday, 7 October, at Grosvenor House, Park Lane, London W.1.

Q. and Q. Glass Machine for U.S.



Photograph shows a semi-automatic conical joint-grinding machine recently delivered by Quickfit and Quartz to Corning Glass Works of America. The three positions on the left are used for the rough grinding of naked glass and the three on the right are used for finished grinding. Alternatively all six positions can be used for either rough or finished grinding according to requirements. The machine grinds conical joints from 2 to 55 mm. in diameter. It will be used by Corning Glassworks for research into joint production

"I.C.I. Not Abandoning Widnes"

ASSURANCES are being sought from I.C.I. Ltd. by Widnes Town Council, that its activities in Widnes will not decrease in the foreseeable future. A deputation from the council a few days ago put its case to Mr. H. Smith, chairman of the general chemicals division I.C.I., Mr. D. H. Carter and Mr. J. C. Brown, the two managing directors, and Mr. C. J. P. Bateson, divisional personnel director.

An agreed statement indicated that Mr. Smith gave his assurance that I.C.I. had no policy of abandoning Widnes. On the other hand, there was also no positive policy of expansion there. He explained why, in order to compete with foreign and other British chemical manufacturers, it was essential for a major enterprise such as I.C.I. to operate in large aggregates of plant.

The industry, especially with the development of oil chemistry, had become so complex that many processes required integration with other processes for their economic operation. For this reason it was essential to regard Merseyside as a single area.

Study Tour of U.S. Plastics Industry

A STUDY tour of the U.S. plastics industry, linked with the Exposition of Chemical Industries at the New York Coliseum, has been arranged by Ashton and Mitchell Travel Ltd., 2 Old Bond Street, London W.1, at a cost of £355. It gives 15 days in the U.S. A shorter tour, costing £225, is also available.

Travel is by Pan American jet Clipper to Idlewild Airport on Saturday, 28 November. During a five-day stay in New York accommodation will be provided at the Edison Hotel. There will be visits to the exhibition and to Lunn Laminates Inc., glass fibre moulders, the Shell Oil Co. technical services laboratory and Commercial Plastics and Supply Corporation as well as a programme of entertainments and sightseeing.

The tour continues with the following visits:

Philadelphia—F. J. Stokes Corporation.

Wilmington—E.I. du Pont de Nemours and Co., Hercules Powder Co., Haveg Industries Inc.

Washington—Sightseeing tour.

Buffalo—National Aniline Division of Allied Chemicals, Farrel-Birmingham Co., Niagara Falls.

Albany—General Electric Co. polycarbonate plant.

Springfield—Monsanto Plastics Division; followed by Foster Grant Co., Leominster.

Boston—Lowell Technological Institute, America's leading college for plastics engineering.

Company Cannot Make Tests in Lake

The Dee and Clwyd River Board have refused an application from Price's (Bromborough) Ltd. for permission to carry out trials at Bala Lake with water conservation alcohol blends. The board think the trials may involve risks to fish and fish food.

LEIPZIG GIVES EAST GERMANY A CHEMICAL SHOP WINDOW

PROMINENCE was given to East German pharmaceutical production at the Leipzig Fair, which opened on 30 August. The unusually big section consisted of displays by the state-owned companies, exhibitions of the many private and semi-private pharmaceutical concerns and stands of foreign exhibitors.

In pharmaceuticals, a spokesman told CHEMICAL AGE, East Germany's needs from abroad are becoming negligible and its exports increasing. In particular, demand for serums, vaccines and prophylactics is being met by home production.

Great stress was given to the agricultural chemicals field in Hungary, in particular to plant protection media and pesticides. Not only does East Germany itself have a large demand for these preparations, but it is building up a large export industry.

The two major chemical producers from the western world showing at Leipzig, Farbenfabriken Bayer AG of West Germany and J. R. Geigy AG of Switzerland, both devoted much of their display section to such media, Bayer giving their Metasystox product pride of place. Virtually every one of East Germany's leading chemical manufacturers—VEB Elektrochemisches Kombinat, VEB Leuna-Werke 'Walter Ulbricht', VEB Farbenfabrik Wolfen, VEB Fettchemie and VEB Berlin-Chemie—showed a large range of these plant protection agents and pesticides.

Elektrochemisches Kombinat

The Elektrochemisches Kombinat is one of Europe's largest single producers of chemicals and metals. At Bitterfeld they manufacture a remarkable range of products, the vast majority of which were on show at their various stands at the fair. Their exhibits ranged from agricultural chemicals to synthetic jewels, from synthetic detergents to magnets, from sodium metal silicate to p.v.c. The company is now said to be Europe's main producer of chlorates. An indication of the expected rate of growth of the combine was given by figures on show at the company's agricultural chemicals' stand; taking 1958 as 100, it was stated, Bitterfeld output would be 108 in the current year, 115.6 next year, 126.1 in 1961 and as high as 196.3 by 1965, final year of the new stage in the country's planned economy.

Among other leading East German firms on show were VEB Leuna-Werke Walter Ulbricht with products including amines and aldehydes, VEB Fettchemie with a large range of fatty acids and industrial chemicals and VEB Chemiewerk Greiz-Dölau, with a full range of metal stearates and aluminium oxide for chromatographic uses.

There was one of the most comprehensive showings yet of East Germany's plastics, synthetic fibres and synthetic resins. Although there are at present only two producers of synthetic resins of considerable size in the Eastern Republic—VEB Leuna-Werke Walter Ulbricht and VEB Stickstoffwerk Piesteritz—there are already relatively very many producers of thermoplastics: some ten exhibited at Leipzig.

Synthetic fibres, now being produced in ever greater quantities in Eastern Germany, both for export and for home consumption, were on view in several parts of the fair. Rayon, nylon-6, the polyamide-based Dederon and the other four 'native' synthetics, Perlon, Lanon, Wolcrylon and Prelana, were on show alongside many synthetic-natural mixture materials.

The determination of the government to build up a strong and exporting textile products industry has also had the effect of pushing up sales of auxiliary chemicals for the textiles industry in East Germany, and this branch of the country's chemical industry is now aiming at exports, both in industrial markets and in such domestic items as dyes, washing blue and detergents.

Diversification Plans in Hand by Fertilisers and Chemicals, Israel

Since they began to operate a small plant in the Haifa Bayside area of Israel 10 years ago, Fertilizers and Chemicals Ltd. have grown into a large combine of more than a dozen plants worth well over I£50 million. From producing 3,000 tons of sulphuric acid a year in 1949 which was used to process just over 5,000 tons of superphosphate, F. and C. now supply Israeli agriculture and industry with 15 different major chemicals, in weight over 200,000 tons a year, meeting all the country's needs in fertilisers.

Bulk of F. and C.'s output today are fertilisers. Existing plants are being expanded and new ones erected to produce a variety of compound and liquid fertilisers. An I£12 million extension of the ammonia plant will go on stream before the end of 1959.

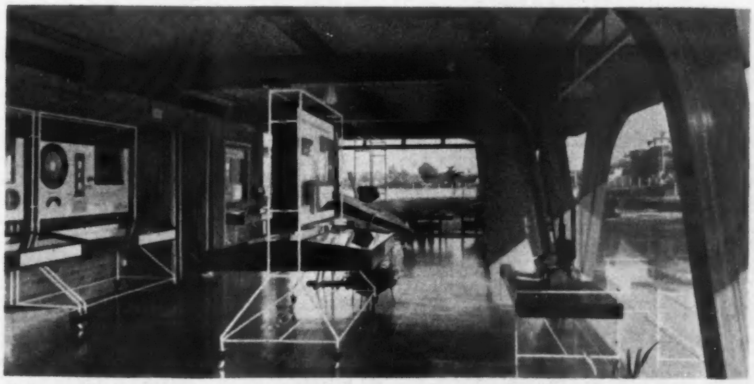
Recently F. and C. entered the market as producers of "Mr. Kleen" detergents and in the near future, they will diversify their output by including new and valuable industrial chemicals, using the low-cost by-products and ancilliary services of existing plants.

Of the labour force of over 1,100 employed, two-thirds are engaged in operation and maintenance and one-third in engineering, research and administration. Registered capital is I£25 million and issued capital totals I£17,304,875. Sales in 1958/59 exceeded I£22 million. Shareholding groups with voting rights as at 31 July 1959 were as follows:

State of Israel	5.7%
Kadimah Chemical Corp., Delaware U.S.	10.5%
Hamashbir Hamerkazi (Finances and Investments) Co. Ltd.	9.5%
Ampal-America Israel Corp., N.Y. ...	7 %
Drewpen Investment Ltd., Liverpool ...	6 %
Mr. S. Rothberg, Peoria, Illinois	2.5%
Canada-Israel Development Corp., Ltd. ...	2.5%
Palestine Economic Corp., of New York ...	1.7%
Dead Sea Works Ltd. (Government Controlled)	0.9%
Various shareholders	2.4%
	100%

Main local distributors are Hamashbir Hamerkazi, Israel Corp., Wholesale Society Ltd. Sole export agents are Kishon Chemicals Ltd., P.O.B. 722, Tel-Aviv and 18 East 41st Street, New York 17, N.Y., U.S.

CIBA's New Duxford Showrooms



CIBA (A.R.L.) Ltd., Duxford, Cambridge, have recently opened a new display room to show the uses of their synthetic resins and synthetic resin adhesives. Portal frames made by Saunders-Roe (Anglesey) Ltd. and glued with Aerodux resorcinol resin are the main feature of design; the 70 ft. by 20 ft. floor area is paved with Blue Hawk (British Plaster Board (Manufacturing) Ltd.) tiles of a type originally developed at Duxford

NEW PROCESS DEVELOPED FOR HYDROMETALLURGY OF COPPER BY AUSTRALIAN WORKERS

A VARIETY of developments in industrial chemistry are reported by C.S.I.R.O. of Australia (Commonwealth Scientific and Industrial Research Organisation) in its 10th annual report for 1957-58. In the mineral utilisation division of industrial chemistry, the investigation of the hydrometallurgy of copper has been completed, a new process for obtaining high-purity thorium has been discovered (see C.A., 20 June, p. 1026). new examples of molecular compounds of graphite have been found and work is in progress on the hydrolysis of iron and aluminium sulphate solutions at high temperatures. In the organic chemistry section of the industrial chemistry division, sugar cane wax refining has been under investigation and screening for plant alkaloids has been undertaken; while in the chemical engineering section, separation of rutile from ilmenite is being evaluated.

Hydrometallurgy of Copper. This investigation has concerned the possibility of replacing conventional smelting and refining by leaching and electrolysis, after an initial roast in a fluidised bed reactor. Objectives of the project became: to recover as much copper (97%) from the calcine as possible; to recover as much gold from the calcine as possible; to deposit the copper in a sufficiently pure form for direct melting and casting (i.e. impurities not exceeding a few p.p.m.); to deposit copper in a massive coherent form for easy transport and processing; to recover copper with the minimum consumption of power (since power for electrolysis may amount to two-thirds of the total running costs of the whole roast leach plant; to produce as little waste acid as possible, thus obviating the need to neutralise large quantities of acid with limestone to avoid pollution of adjacent water supplies; and finally, to integrate the various parts of the process into a workable whole.

Key to Success

Key to success, it was shown, was careful control of roasting. Best roasting techniques achieved a 97% recovery. The second object was achieved by cyanidation whereby more than 90% of the gold from the calcines was recovered. Economics of cyanidation depend on the method of roasting and leaching. Unexpected difficulties arising in preparation of pure copper have led to the discovery of molybdenum as a new addition to the metals whose presence is deleterious to copper. Small quantities of molybdenum in the concentrate produced metallic copper too brittle to be handled. These also caused arsenic to concentrate in the copper. To prevent molybdenum (and arsenic) deposition in copper, small amounts of chloride are added to the electrolyte.

Power consumption, which depends primarily on the amount of iron in the electrolyte, can be reduced by control in the leaching and roasting stages, although more effectively by solution purification. Roasting control has also enabled less acid and less sponge copper to be produced.

Extraction of bismuth, lead and cobalt from calcines of one of the concentrates has also been investigated and promising methods have been found for recovering about 80% of each metal in the form of a concentrate.

Chemistry of Graphite. Interest in corrosion resistance of graphite used as a moderating material in certain types of atomic reactors has prompted investigation of the reactivity of graphite towards several materials such as metal coolants which may also be present. The possibility is being studied of taking advantage of the high selectivity shown by graphite in its intercalation reactions to effect separation of fission products during reprocessing of spent atomic fuel elements. The possibility has also been indicated of varying the electrical and thermal properties of graphite to suit specific purposes by the intercalation of various materials in the graphite lattice. Entirely new anisotropic compounds with possible uses as electrical semi-conductors may be produced by this technique.

Reactors Improved

Pressure Hydrometallurgy. Reactor design has been further improved by incorporating devices for the control and measurement of pH during operation. A new and larger reactor has been built for studying oxygen transfer rates and to allow recirculation of oxygen during operation. Applied studies have also been made on the recovery of valuable base metals from pyritic cinder, using oxygen and water as the sole reagents.

In the non-sulphide field, work is in progress on the hydrolysis of iron and aluminium sulphate solutions at temperatures up to 200°C. Various interesting applications of the new results are envisaged. Iron contamination in copper calcine liquors can be reduced to a surprisingly low level of autoclaving for a brief period at 200°C. The pressure technique has also been used to accelerate the decomposition of several non-sulphide minerals and ores, simultaneously taking advantage of the hydrolytic effects to obtain a purer product. With phosphatic uranium ores, for instance, practically all the phosphate is removed from the leach liquors as insoluble ferric phosphate during digestion.

Sugar Cane Wax. Following the demonstration that the method of refining sugar cane wax with light petroleum and ethanol presented no difficulties when operated on a larger scale, the possible uses of the wax in wax emulsions of the 'self-polishing' type have been examined. It has proved possible, C.S.I.R.O. states, to replace more than 80% of carnauba and other imported waxes in polishes of this type.

Cost of the crude wax is such a large proportion of the final cost of the refined wax because about half is discarded as a fatty by-product with little or no market value as such. Conversion of this fat into materials of commercial value may be possible, it is believed, as it contains among other ingredients 4% of sterols, of which a large proportion is stigmasterol.

Rutile from Ilmenite. Work began in 1957 on a new project aimed at the evaluation and development of a new process for the production of granular rutile from ilmenite. This process consists of two main stages, namely, the reaction of ilmenite with sulphur vapour at 700° to 850°C., and a hydrothermal oxidation of the sulphided, performed in an autoclave at 100° to 140°C. In the second stage, iron compounds are removed, leaving skeeltal aggregates of substantially pure titanium dioxide and elemental sulphur is recovered.

Study of the ilmenite-sulphur system has been performed in a small, batch-operated, fluidised bed reactor. This has provided quantitative information on the conditions required for production of an optimum product, and the factors influencing sulphur utilisation. Design data for a practical reaction system have also been obtained. Attention is now being directed to a systematic study of the second stage of the process.

Research Into Fuel Cell Development

The research and development department of the Central Electricity Generating Board is forming a team of chemical engineers and physical chemists to study the application of fuel cells for large-scale generation and storage of electricity.

Their initial work will be to carry out detailed design studies for large installations and the formulation of a programme for development of prototype cells and associated plant.

Polishing Solutions Delivered By Tanker

Bulk deliveries of Phosbrite 159 chemical polishing solution are now being made to Haynes, Ford & Elliott Ltd., the Birmingham metal finishing firm, by Albright and Wilson (Mfg) Ltd.

The first deliveries, made by 6-ton tanker, will cut costs and make handling very much easier. Haynes, Ford & Elliott have installed a 1,000 gal. storage tank to take the supplies.

Pipeline from Sahara Oilfields

The French branch of the Royal Dutch-Shell group has floated a loan of 20 million francs, part of which is to finance the laying of a pipeline from the Sahara oilfields to the Mediterranean coast. The company responsible for this scheme is the Compagnie des Transports par Pipeline au Sahara (Trapsa), of which Royal Dutch-Shell own 35%.

Overseas News

FURTHER EXPANSION OF FUMARIC ACID IN U.S.: PRICES REDUCED

EXPANSION of their 5 million lb.-per-year fumaric acid plant at Moundsville, W. Virginia, is announced by National Aniline Division of Allied Chemical Corporation. Capacity will be raised to 15 million lb. a year by June 1960, giving an overall capacity of 20 million lb. a year (including 5 million lb. of capacity at Buffalo, N.Y.).

Last week, National Aniline and other U.S. producers of maleic anhydride reduced the price of anhydride to 23½ cents lb. in carload lots and the price of fumaric acid to 22¾ cents in carload lots. Monsanto Chemical have cut the price of fumaric acid by about 15% to 22¾ cents a lb. in drum carloads. This follows Monsanto's 18% reduction in the price of maleic anhydride.

Explaining the reduction, Monsanto say that production economies which will result from a capacity increase for maleic anhydride prompted the fumaric acid price cut. The new price is effective on all 1960 contracts and on a spot basis after 1 January.

W. German Phthalic Anhydride Plant for Yugoslavia

Destilaciá Drava, of Teslic, Yugoslavia, have granted to the West German company, Chemibau Dr. A. Zieren GmbH, Cologne, a contract for erection of a plant for the production of phthalic anhydride. The plant, which will use the process developed by the Munich, West German, concern, Chemische Fabrik von Heyden AG, will have a monthly production capacity of 80 tonnes.

Israeli Potash Production To be Raised

Three new evaporation pans are to come into operation shortly at the Dead Sea Potash Works at Sodom, Israel. The pans will be able to raise production to 135,000 tons this year, and to 175,000 tons in 1960. Last year's output was 110,000 tons.

French Sulphuric Acid Production Up

Production of sulphuric acid in France during the first quarter of 1959 totalled 467,157 tons, compared with 451,080 tons during the first quarter of 1958.

In the same period production of sodium carbonate was 169,928 tons, against 193,925 tons in 1958.

Reichhold to Build Melamine Plant

Plans to build a multi-million dollar melamine plant "somewhere in the south" of the U.S., were announced by Mr. Henry H. Reichhold, President of Reichhold Chemicals, Inc. Initial capacity of the plant, which is scheduled to go on stream early in 1961, will be 20 million pounds a year, but it will be designed for eventual expansion to 50 million pounds annually.

"Our new plant", Mr. Reichhold stated, "will make RCI the second major supplier of melamine in the U.S. and we will be entering the market at a very opportune time. Demand for this chemical and for melamine moulding compounds and resins is increasing very rapidly from manufacturers of plastic products, laminates, surface coatings, paper and textiles.

"This is but one step in the $24,000,000 three-year expansion programme upon which we embarked in 1958."

Poland's Five-Year Chemical Plan

In its next five-year plan (1961-65), Poland is to spend 60% more on chemical investments than in the current five-year plan (1956-60) and 90% more than in the past six-year plan (1950-55). Main investments under the new plan are to be in the oil refinery and by-products works at Plock, Tarnów, Nitrogen Works, the synthetic fibre works at Wloclawek, the Oswiecim chemical combine, Kedzierzyn nitrogen works and Tarnobrzeg Sulphur combine.

Building up of the Tarnobrzeg plant is connected with the discovery of rich sulphur deposits there which promise not only to cover Poland's own demands but to make her into an exporting country. By 1960 this combine's sulphuric acid plant will be producing 100,000 tonnes annually and in coming years its capacity will be brought up to 300,000 tonnes. A superphosphate plant on the site is to have an annual capacity of 200,000 tonnes.

Hong Kong Chemical Imports and Exports

In 1958 Hong Kong imported chemicals worth 117,997,000 Hong Kong dollars (about £7,300,000) and exported chemicals to the value of 4,724,000 dollars (about £300,000). Corresponding figures for 1957 were 82,190,000 dollars and 10,564,000 dollars.

Triple Tank System Ships Liquid Fluorine

For transporting liquid fluorine in tonnage lots, General Chemical Division, Allied Chemical Corporation, U.S., have developed a triple tank system.

Described as a giant thermos flask, the unit carries 5,000 lb. fluorine as a liquid. The innermost tank containing the fluorine is made of Monel (nickel-copper alloy), which provides the required resistance to corrosion combined with strength at the low temperatures involved. This is surrounded by a stainless steel tank containing liquid nitrogen refrigerant. The outermost tank of mild steel carries a granulated insulating material under vacuum.

Bulgaria's Chemical Production Increased

According to Bulgaria's Central Bureau of Statistics, production of chemicals in the first half of this year was as follows: nitrate fertiliser, 26,403 tons (15% increase compared with the same period in 1958); phosphate fertiliser, 15,645 tons (142% increase); sulphuric acid, 45,739 tons (+54%); caustic soda, 8,082 tons (+12%); cellulose, 9,476 tons (+12%); lead concentrate, 88,984 tons (+22%); and zinc concentrate, 53,238 tons (+12%).

Sicily Steps Up Output of Some Chemicals

Increased production in 1958 is reported by many sections of the Sicilian chemical industry. An exception is sulphur, where output fell by about 10% (compared with 1957) to 127,000 tons.

Output of sea salt also fell, but rock salt at 263,000 tons was up by 28%.

Production of crude petroleum was 1,437,308 tons (plus 25%) and of methane 20 million cubic metres (also plus 25%).

Production of kainite ore, which started in 1957 with an output of 1,105 tons, reached 60,585 tons in 1958. Some of the output will go to a fertiliser factory which is being expanded at Campofranco.

A plant for the production of polythene is being built at Ragusa and one for ethylene and propylene from petroleum products at Syracuse.

Dow Chemicals and Polypropylene

Dow Chemical Co. are to build a polypropylene plant at one of several West Coast sites now being studied. They also plan to produce polypropylene in part of their linear polythene plant at Bay City, Michigan. It is expected that polypropylene will be produced there early next year. During the last year, Dow have doubled output at their high pressure process polythene plant at Freeport, Texas, are building a new high pressure process plant in Louisiana, and have started up a linear polythene plant at Sarnia, Ontario, Canada.

Austrian Polypropylene Production To Start In 1960

Having regard to the vigorous competition obtaining in the world market in sales of nitrogenous fertilisers, Osterreichische Stikstoffwerke AG, Linz, Austria, manufacturers of fertilisers, plant protection agents, chemicals and pharmaceuticals, report that their nitro-

genous fertiliser sales have developed "very satisfactorily." They report also increases in the sales of urea, cement, organic chemicals, adhesives and pharmaceuticals.

In the nitrogen sector, China was the company's largest customer. Increases in exports of nitrogenous fertilisers to Spain, and Portugal were also noted, whereas sales to Egypt, Hungary, Yugoslavia and Greece dropped during the year. In Egypt this development was due not so much to lack of demand, but to currency difficulties. Good prospects for nitrogenous fertiliser sales in India and Turkey are reported.

In view of the heavy competition in the fertiliser field and the efforts at integration throughout the world, and particularly the common market and free trade area, the company plans to expand its production programme primarily by investments based on the availability of natural gas.

Polypropylene production at Danubia-Petrochemie AG, the company jointly owned by Osterreichische and Montecatini of Italy, is expected to begin at the end of 1960. The plant will be located immediately adjoining the new refinery at Wien-Schwechat. Danubia-Petrochemie AG will issue a $100 million loan during the next few months backed by joint guarantee of Osterreichische and Montecatini.

With two well-known foreign companies in the nuclear energy field, Osterreichische are to establish a company to manufacture fuel elements for nuclear energy installations.

Israel to Make Own Plasticisers

The chemical pilot plant at the Technion, Israel Institute of Technology, has completed the development of two compounds—raw materials for plastics—which may open a new industry in Israel and make possible large savings in foreign currency.

These compounds—ester plasticisers—are at present exclusively imported from abroad. The production depends on a supply of sebacic acid, derived from castor oil, which is readily available.

The chemical pilot plant has been in operation since 1955 to carry out applied research for the chemical industries.

The equipment was received as part of the U.S. grant for technical aid to Israel.

Contract Placed for Ethylene Oxide Process

Olin Mathieson Chemical Corporation have appointed the Lummus Company prime contractors for installing the Shell ethylene oxide process by the direct oxidation of ethylene at the corporation's Doe Run, Ky., plant. The new construction is part of the recently announced $30 million expansion programme for the Chemicals Division. The process will be on stream in October 1960.

Other segments of the $30 million programme for Olin Mathieson include a new sulphamic acid plant at Joliet, Ill, new electrolytic chlorine cells at Niagara Falls, N.Y., and other improvements at Doe Run, including construction of a new synthetic glycerine facility.

Blending Polyester Fibre to Rubber

Canadian Industries Ltd. report that they have discovered a cheaper and more efficient system than those now used for bonding polyester fibre to rubber.

They say the development may have world-wide implications in manufacture of tyres, industrial V-belts, automobile fan belts, conveyor belting and other mechanical goods.

Dow Chemical Plan Phenol Plant

Dow Chemical of Canada Ltd. plan to build a phenol plant in the Vancouver area, where soil tests are now being made.

No estimate of the plant's cost has been given, but it is understood to be in the "multi-million-dollar" classification.

Big Loan Expected for Central American Plant

The Instituto Centroamericano de Investigaciones y Tecnologia Industrial is preparing a plan for a Central American fertiliser plant and fertiliser mixing plant. The Central American countries are expecting a grant of nearly a million U.S. dollars from the United Nations Special Fund.

U.S. Subsidiary Building Plant in Peru

Work has begun on an $8 million chemical plant at Paramonga, Peru, by Alcalis Peruana S.A., a subsidiary of W. R. Grace and Co., New York.

When the first stage is completed—by the middle of 1960, it is expected—daily production will be 25 tons of rayon-grade caustic soda, 22 tons of chlorine and two tons of bleaching powder. Completion of the second stage, due in 1962, will double this output.

The Export-Import Bank is lending $840,000 to finance purchase of machinery and services in the U.S.

Italy Proposes C.M. Tariff on Sulphur Imports

The Italian Ministry has laid down the following classification for raw sulphur:

Yellow: Extra, pure sulphur content not less than 99.5%; commercial, minimum sulphur content 99%.

Brown: Minimum sulphur content for the Marches-Romagna mines, 99.5%; minimum content for first quality is 98% and for second quality 96%.

Concentrated: 'Damp', minimum sulphur content, 80%, maximum humidity, 15%; 'dry', 60% and 3% respectively.

At forthcoming meetings in Brussels, the Ministry is to advocate a uniform Common Market duty of 10% or 15% on imports of sulphur into the C.M. area. At present imports of sulphur are banned in Italy.

30% Increase in O.E.E.C. Petrochemical Production

Total capacity of the West European petrochemical industry in 1958 increased to about 830,000 tons, a 30% rise compared with 1957, states the Organisation for European Economic Co-operation. This total capacity is divided as follows: U.K., 327,000 tons; West Germany, 187,000 tons; France, 142,000 tons; Italy 130,000 tons; Holland, 45,000 tons.

New Polypropylene Facilities For Montecatini Group

Polymer of Terni, an affiliate of Montecatini, Milan, who produce Movil, a synthetic textile fibre, are also to produce Meraklon, a new fibre of the polypropylene type. The company is building a new plant that will start operating with 5,000 tons a year of yarn and film. Plant design will permit doubling this capacity when the need arises.

Polypropylene Goes Ahead in the U.S.

SECOND polypropylene plant in the U.S. now on stream is that of AviSun, the jointly formed company of Sun Oil and American Viscose, at Port Reading, New Jersey, U.S. It will produce 20 million lb. a year. The first U.S. polypropylene plant is that of Hercules Powder, also with a capacity of 20 million lb. a year.

Other polyproplene plants are due on stream shortly in the U.S. These are, Humbie Oils' 40 million lb.year plant by next February and Montecatini, through their subsidiary Novamont, who plan to have a 11-million lb./year plant in operation by early 1961.

Expansion plans are in the offing too. Hercules are to increase capacity at their Parlin plant to 50 million lb. a year. They hope to reach capacity early in 1960. Plans for another large plant (possibly 100 million lb./year) are under consideration by this company also. Other U.S. companies who are likely to enter the field are Tennessee Eastman, W. R. Grace, and National Distillers, all of whom have pilot plants in action. Also Esso Research and Engineering have pilot plant facilities at Baton Rouge, La., while Avisun have a 1,000 lb. capacity pilot plant at Sun Oil and one at American Viscose at Marcus Hook, Pa.

Avisun evidently plan an eventual capacity of 100 million lb./year, and have an option to buy Koppers' olefin plant which has a 40-million lb. capacity. The company is also building a polypropylene film and fibre plant near New Castle, Delaware, which is due to start up in October and will make up to 500,000 lb./year of continuous filament and fibre.

Avisun are making some filament in the small pilot plant at American Viscose's Marcus Hook plant.

Analytical Review

Complexometric Titration of Highly Coloured Ions

IN THE last review (CHEMICAL AGE, 2 May, p. 733) the problem of designation of end-point sharpness in complexometric titrations was considered in these columns. There is little doubt that such a formulation is very useful to the analyst. It is worth while, however, to consider again this month another problem which may well face many analysts who wish to use EDTA as a reliable and rapid method for determining metals with which they are concerned.

Most metals can be determined complexometrically by a variety of end-point procedures since there are now many indicators readily available but no indicator is of great avail if the solution is coloured or, more particularly, if the EDTA chelate is intensely coloured. The analyst faces these problems with metals such as copper, nickel, cobalt, ferric iron. One way out of course is to dilute the solution down to a sufficient extent to minimise the colour of the chelate and subsequently to titrate with a dilute reagent and normal amounts of indicator, but this device is not always satisfactory.

Physico-chemical End-point

Another approach would be to employ a physico-chemical end-point. Again, however, such methods are not readily available and are frequently difficult. For example, the potentiometric method is simple and direct for metals such as ferric iron and cupric copper (**1**) which can participate in a redox-couple, but for other metals it is necessary to use a mercury indicator electrode system, a device which has not yet achieved the widespread use which it deserves (**2**). Amperometric methods are frequently difficult to apply, conductimetric methods may be unreliable (**3**), high-frequency procedures are readily upset by electrolyte concentration; thermometric titration is practically unexplored (**4**) and spectrophotometric titrations are also little used.

At least two metallofluorescent complexometric indicators have been devised however, *viz*., fluorescein complexone (fluorexone) and morin which by virtue of their fluorescence can be used in highly coloured solutions. So far the use of the first indicator has been restricted to the titration of calcium. It was used first by Diehl and Ellingboe (**5**) and subsequently by several others. Now a paper from the G.E.C. Laboratories in the U.S. shows how the fluorescent effect of the indicator may be used in the complexometric titration of cobalt and ferric iron (**6**). In this method an excess of EDTA is added to the solution at pH 4.8 and the excess is back titrated with a standard solution of 0.03M copper ions with the solution irradiated with U/V light.

The quenching of fluorescence at the end-point is said to be very sharp although the author notes that there is some residual fluorescence. The ferric—EDTA complex absorbs U/V radiation very strongly so that in this instance the end-point is to be looked for only on the surface of the solution. This does not apply to cobalt. The author's opinion that the response of the indicator in the calcium titration is due to a quenching of fluorescence rather than to a true colour-change is not as original as he appears to think; it was reported in the literature some time ago (**7**).

By
T. S. WEST, Ph.D.

This article reviews: (1) EDTA titration of ions which form highly coloured chelates, e.g. cobalt and iron (III) by use of a fluorescent end-point technique.

(2) Direct thermometric titration of boric acid in the presence or absence of strong mineral acids.

(3) An electrochemical separation process for use in conjunction with polarography for the analysis of certain elements, e.g. cadmium, indium, zinc, etc., in metals such as bismuth.

Thermometric Titration of Boric Acid. Most instrumental methods of end-point detection, some of which have been mentioned above. are dependent on the measurement of electrical properties of the chemical system: as such they depend eventually on the measurement of free energy changes. The technique of thermometric titration has not yet achieved much popularity, but it is a method which deserves much more attention than it has received because in essence it measures a property of the system which is not directly measured by, say, potentiometry. This property is of course the antropy change of the reaction since.

$$\Delta H = \Delta G + T\Delta S$$

One interesting application of this method (**4**) constitutes the only method known to the writer where calcium and magnesium can be determined by EDTA titration in one single operation. This is made possible because the entropy changes involved cause the reaction between calcium and EDTA to be exothermic and that between magnesium and EDTA to be endothermic.

Now a new use has been found for the thermometric (enthalpymetric) technique which although not quite so spectacular, amply demonstrates its versatility and underlines its potential importance. Boric acid cannot be titrated directly with sodium hydroxide in aqueous solution with a visual indicator since none gives a sufficiently sharp end-point. The standard method is therefore the mannitol method in which the addition of the polyhydric alcohol results in the liberation of protons due to strong complex formation.

In the most recent edition of Talanta it has been shown that direct titration is possible with thermometric detection of the end-point (**8**). The end-point is quite sharp but it is improved by the addition of mannitol though its presence is not requisite. Moreover it is shown that boric acid and strong mineral acid, H_2SO_4, can be titrated in one operation on the same sample by this method. The sulphuric acid naturally titrates first followed by the boric acid. It is of interest to note that the second ionisation of sulphuric acid is not differentiated from the first by this method or at least one may infer this from the data shown by the authors.

Thermometric Titrations

It may also be relevant here to note that the performance of thermometric titrations requires rather careful manipulative technique. The experiment must be carried out under conditions which are so arranged that heat losses are minimised. Consequently specially designed and isolated vessels are required, and the titration must be carried out quickly. The volume of titrant must also be minimal and the volume of the titration medium carefully chosen. If the latter is too small heat losses may be great but if it is too large little rise in temperature may be observed. The thermistor appears to provide most suitable detecting device for following temperature changes.

Electrochemical Separation Process for Polarography. An electrochemical separation process has recently been described which can be used profitably for the determination of trace-metals in metals such as bismuth lead, and cadmium which dissolve readily in mercury (**9**). If a bismuth amalgam is brought into contact with M HCl containing some Bi^{3+} ions, an exchange of bismuth ions may occur till an equilibrium has been set up and a certain potential exists between the amalgam and the solution. If the bismuth contains another metal impurity and if the potential of the reaction:—

$$M_{(Hg)} \rightleftharpoons M^{n+} + ne$$

is more negative than the bismuth amalgam potential:—

$$Bi_{(Hg)} \rightleftharpoons Bi^{3+} + 3e$$

then M^{n+} ions will pass into the solution, thus achieving a concentration of the foreign ions in the aqueous phase.

The concentration of bismuth in the solution can be controlled by addition of mercurous chloride. The mercurous ion is reduced by the amalgam forming mercury ion while a corresponding amount of bismuth passes into solution. Calculations show that cadmium, indium, lead,

(*Continued on page 352*)

PEOPLE in the news

● The development branch of the Mond Nickel Co.'s development and research department has been reorganised into four divisions under the general managership of Mr. F. Dickinson, a director of the company. The divisions are: Ferrous Division, Manager **Mr. W. W. Braidwood;** Non-Ferrous Division, Manager **Mr. J. Hinde;** Applicational Engineering Division, Manager, **Dr. A. B. Everest;** General Division (including plating, chemical products and nuclear power), Manager **Dr. E. C. Rhodes. Mr. L. W. Johnson,** at present assistant manager of the department, having reached retirement age, will relinquish his appointment at the end of September.

● **Dr. Henry E. Millson,** technical adviser to the Organic Chemicals Division of the American Cyanamid Co., has been in London this week to attend the congress of the International Association of Textile Chemists and Colourists. At a Glasgow meeting of the Society of Dyers and Colourists he is to demonstrate his new high-temperature Microdyescope which has enabled him to take time-lapse moving pictures of the dyeing process.

● **Mr. F. H. Braybrook,** until recently general manager of Petrochemicals Ltd. (an associate of Shell Chemical Co. Ltd.), has taken up a senior appointment in the

F. H. Braybrook

group responsible to the director of co-ordination chemicals in Shell International Chemical Co. Ltd. Mr. Braybrook joined the Shell Group in 1929 and has been associated with the development of chemicals from petroleum since this began in the U.K. during the last war. He was general manager of Shell Chimie, Paris, from 1950-55, becoming general manager of Petrochemicals Ltd. in 1955. As a result of recent organisational changes, Mr. Braybrook's functions as general manager of Petrochemicals will in future be the responsibility of the management of Shell Chemical Co.

● **Dr. F. L. Rose, O.B.E., F.R.S.,** an associate research manager in the Pharmaceuticals Division of I.C.I., has been appointed honorary reader in organic chemistry to the University of Manchester, in the Faculty of Technology. It is believed that fresh ground is being broken in this connection by the appointment of Dr. Rose, who had already anticipated his duties by a course of lectures to final-year honours students at the College of Science and Technology early this year. He will supervise a certain amount of post-graduate research at the college. After obtaining a first in chemistry in 1930 at the former University College of Nottingham Dr. Rose engaged there on a period of research under Professor F. S. Kipping, F.R.S. (the 'father' of silicone chemistry) which led to a Ph.D. He joined I.C.I. at Blackley, Manchester, as a member of the Azo Dyestuffs Section, research department, and was seconded in 1936 to the newly-formed Medicinal Chemical Section.

● **Mr. R. S. Medlock, B.Sc., A.R.I.C., A.M.I.E.E., A.M.I.Mech.E.,** technical and home sales director of George Kent Ltd., has been elected president of the Society of Instrument Technology, of which he has been previously vice-president and chairman of the control section. Mr. Medlock joined George Kent Ltd. in 1935 as an electrochemist.

● William Boby and Co. Ltd., water treatment engineers of Rickmansworth, Herts, have appointed a chief development chemical engineer, **Mr. G. S. Solt, B.Sc., A.M.I.Chem.E.,** formerly with I.C.I. Boby's, pioneers in purification of liquors by an electric cell process, have designed and are building the world's largest deaerator.

● **Mr. J. C. Christopherson,** a director of Albright and Wilson Ltd., has been appointed to the Grand Council of the Federation of British Industries. He has also been co-opted to the council of the Association of British Chemical Manufacturers.

● **Mr. Laurie A. Woodhead,** general manager of Cossor Instruments Ltd., and president of the Scientific Instrument Manufacturers' Association for 1959-1960, has been closely connected with the electronics industry for over 42 years.

● **Mr. Stanley H. Elliott,** managing director of H. J. Elliott Ltd., E-Mil Works, Treforest Industrial Estate, Pontypridd, Glam, manufacturers of laboratory glassware, is flying to Canada on 2 October for three weeks to take part in a special display of their products organised by Canadian Laboratory Supplies Ltd., in Toronto and Montreal from 5-8 October and 19-22 October.

● The research director of Ferodo Ltd., **Dr. R. C. Parker,** is visiting the U.S. for three weeks. He will hold technical discussions with the S. K. Wellman Company, in collaboration with whom Ferodo Ltd. are manufacturing sintered metal products in the U.K., and the Bendix Aviation Corporation, with whom Ferodo exchange technical information on the development of cerametallic friction materials.

Obituary

Professor Sir Ian Heilbron, D.S.O., F.R.S., died on Monday, 14 September, aged 72. He was born in Glasgow and educated at Glasgow High School and the Royal Technical College, later spending two years at Leipzig on a Carnegie Fellowship. He became a lecturer at the Royal Technical College in 1909. During the 1914-18 war, in which he became Assistant Director of Supplies in Salonika, he was awarded the D.S.O. After the war he was for a short time with the British Dyestuffs Corporation in Manchester and professor at the Royal Technical College in Glasgow, after which he held successively the chairs of organic chemistry at Liverpool, Manchester and Imperial College, London. In 1949 he became the first director of the Brewing Industry Research Foundation.

Sir Ian was a pioneer in the application of chromatography to the purification of natural products and of ultra-violet light absorption to the determination of their structures. Among his many publications is the Dictionary of Organic Compounds.

On 6 September, **Mr. John Henry Cumpsty,** until recently a director of Blackwell's Metallurgical Works Ltd., Garston, Liverpool. Mr. Cumpsty had been associated with the company for over 60 years.

Analytical Review

(Continued from page 351)

thallium and zinc can be determined as impurities in bismuth metal by this method. Copper is too electropositive to be susceptible to such treatment. The method was also applied to the determination of small amounts of zinc in cadmium metal and should also work well for cadmium and zinc in lead metal and zinc in thallium.

This separation method is ingenious and gives virtually 100% recovery under controlled conditions. Furthermore it avoids contamination which usually occurs in concentration methods which employ precipitation and it is less susceptible to loss of material. In addition, it is less tedious and easier to apply than the generally preferred electrodeposition methods.

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Commercial News

Aspro-Nicholas

First-quarter trading results, ending 30 June last, for Aspro-Nicholas are reported by chairman, Mr. Maurice A. Nicholas, as having continued to be satisfactory. He emphasises that the group is beginning to see the benefits of its recent acquisitions of Chemical Products Ltd. and Astat, and, in anticipation of increased earnings, the company has declared a first interim dividend of 6¼% on account of the year to 31 March, 1960. Four interims, each of 6% were paid for 1958-59.

C. A. Parsons

Machinery and scientific instrument, etc., manufacturers, C. A. Parsons and Co. Ltd., are raising their interim dividend from 3¾% to 4¾% for 1959. The 1958 effective total of 8¼% included a special interim of ½% for the current year.

William Warne/David Moseley

The directors of William Warne (Holdings), manufacturers of rubber products, and David Moseley and Sons, rubber and plastics manufacturers, are considering the advantages of an amalgamation of the two companies.

Deutsche Shell-Chemie

A new chemical company, Deutsche Shell-Chemie AG, was registered this month in Hamburg. The new firm is owned to a major degree by the Deutsche Shell AG, the German branch of the Royal Dutch-Shell oil group. The main job of the new company, which will be based in Frankfurt-on-Main, will be to take over the work of the former Chemical Division of Deutsche Shell.

NEW COMPANIES

CLEENOL PRODUCTS LTD. Capital £10,000. To acquire the goodwill, plant, machinery and stock-in-trade of the business of distributors and manufacturers of detergents, sterilisers, cleaning materials and general merchants carried on by J. S., N. T., and S. E. Foster as Cleenol Products Ltd., etc. Directors: John S. Foster, Neville T. Foster, both directors of Puragene Products Ltd., Samuel E. Foster, David N. Foster (director of Harker, Taylor & Foster Ltd.), and Reginald J. Glissan. Reg. office: 82 Fazeley Street, Birmingham 5.

CHATTEM CHEMICALS LTD. Capital £1,000. Manufacturers, importers, exporters and distributors of and dealers in chemicals, pharmaceutical preparations, drugs, etc. Solicitors: Millett and Co., 85 London Wall, London E.C.2.

DELBAG FILTERS LTD. Cap. £500. To carry on agencies for the import, export, purchase and sale of filtering equipment and machinery for the chemical, brewery, plating and other industries, etc. Directors: G. Haimes and G. W. Goodburn. Reg. office: 2 Church Road, Stanmore, Mdx.

K. S. EAGLES AND CO. LTD. Capital £100. Manufacturers, importers and exporters of and dealers in paraffin, petrol, diesel, chemical, industrial, medicinal and other solvents, etc. Directors: Kenneth S. Eagles and Constance W. Eagles. Reg. office: 72 Station Approach, Hayes, Kent.

INDUSTRIAL SCIENCE LTD. Capital £1,000. Chemical, medical, surgical, dental, pharmaceutical and engineering consultants, scientists, analysts, etc. Directors: Laura P. Leader, David B. Lye. Reg. office: Palmerston House, Bishopsgate, London E.C.2.

NEWMAN-GREEN VALVE CO. LTD. Capital £50,000. Chemists, chemical engineers, designers, injection moulders, etc. Directors: W. E. Mueller, director of Parco (Chemicals) Pty. Ltd., T. M. Ramsay, director of Kiwi Polish Co. Pty. Ltd. Reg. office: 1 Brumwill Road, Hanger Lane, London W.5.

WILCOT MEDICAL SUPPLIES LTD. Capital £100. Manufacturers of and dealers in laboratory reagents, chemicals, gases, drugs, etc. Directors: A. Anisfeld, A. A. Sider, D. Kropach and D. I. Sutherland. Reg. office: 252 High Road, Willesden, London N.W.10.

WILLIAMS ANSBACHER LTD. Capital £20,000. Manufacturers of and dealers in aniline dyes, organic chemical pigments and dyes and purified inorganic pigments and chemicals of all kinds, etc. Solicitors: Linklaters' and Paines, 59/67 Gresham Street, London E.C.2.

IAN SUMMERS LTD. Cap. £100. Manufacturers of and dealers in machinery for the chemical and pharmaceutical industries, etc. Director: H. J. Pickavance. Reg. office: Newstet Road, Kirkby Industrial Estate, Liverpool.

Anglo-American Company For Control Systems

AN ANGLO-AMERICAN venture to design and manufacture automatic control systems for industry, Hagan Controls Ltd., has been initiated by the Plessey Co. Ltd., Ilford, and Hagan Chemicals and Controls Inc., Pittsburgh, Pa.

The Plessey Co. Ltd. hold 90% of the shares in the new company, which is to begin operations at Ilford immediately.

Hagan Controls Ltd. will have the manufacturing and selling rights for the entire range of Hagan automatic control equipment for the maintenance of physical conditions within given tolerances and Kybernetes data processing equipment in Great Britain and the Commonwealth except Canada.

Mr. A. G. Clark is chairman of Hagan Controls Ltd.

I.C.I. Deny Big-Scale Dismissal Reports

I.C.I. Salt Division have denied rumours that there will soon be large-scale dismissals through redundancy at Vale Royal and Winsford Works. The company have issued the following statement: "The cessation of open-pan salt production and the greater concentration of the Salt Division's activities has made some changes necessary in the staffing of a number of Division departments. A few engineering draughtsmen have accepted transfers to other parts of the company, and every endeavour is being made similarly to place the small number of other staffs affected."

Chemico Urea Film

A sound film of the 100 tons/day urea plant recently completed by Chemico for Monsanto Chemical Co. at El Dorado, Arkansas, is available for viewing on request to Chemical Construction (G.B.) Ltd., 9 Henrietta Place, London W.1.

Market Reports

PLASTICS MATERIALS MOVING WELL

LONDON There has been a good volume of home trade inquiry for industrial chemicals with buyers prepared to cover more than immediate requirements. Materials for the plastics industry have been moving well, and the slightly better demand for textile chemicals has been sustained. Prices generally are steady to firm. There has been no change in the position of agricultural chemicals. In the coal-tar products market pitch and refined tar are being called for in good quantities on home and export account.

MANCHESTER Steady trading conditions have been reported in most sections of the Manchester chemical market during the past week. Traders have handled a fair flow of inquiries from industrial consumers in the home section and in the aggregate the quantity being taken up against contracts tends to expand. A continued satisfactory feature is the maintenance of the demand on shipping account. There has been relatively little change in the price position, the general undertone being steady. A moderate weight of business is being done in the nitrogenous and the compound fertilisers, and in the tar products market movements of most lines are on a reasonably steady scale.

SCOTLAND There has been little alteration during the past week in business generally in the Scottish heavy chemical market. Demands have been well maintained and interests have extended over a fairly wide range of chemicals. Quantities also have been well up to normal, both in regard to spot and contract requirements. Prices have remained firm except those pertaining to metal derivatives which have shown some variation. The export market continues steady.

TRADE NOTES

Albright and Wilson Agents

Albright and Wilson (Mfg.) have appointed Axel H. Ågren A/B of Gothenburg as their sole agents for Sweden.

They have previously operated through three separate agents in the Stockholm, Gothenburg and Malmö districts. The company has had a long-established export business to Sweden for a wide range of phosphorus compounds and phosphates, together with some fine chemicals and sundry organic products.

Axel H. Ågren A/B also represent Marchon Products Ltd., another company within the Albright and Wilson international chemical group.

QFV in Europe

QVF Ltd., chemical engineers in glass, Fenton (Staffs) have just completed an exhibition in Stockholm held in conjunction with their Swedish agents, the Edstrom Trading Co.

"The exhibition has been a complete success," said Mr. J. G. Window, sales director of QVF Ltd. "We have received valuable orders and a tremendous volume of inquiries."

On show at the exhibition was a 100-litre still, a one in. climbing-film evaporator, and a 12-in. absorption column.

Other forthcoming QVF exhibitions in Europe will be at Utrecht, Holland (October 12-20) and Brussels (October 23).

High-Vacuum Equipment

A broadsheeet published by General Engineering Co. (Radcliffe) Ltd., Bury Road, Radcliffe, Lancs, gives information about their Genevac range of high-vacuum equipment, comprising pumps which have been on the market only a few months.

Chlorinated Polyether for Linings

Hercules Powder Co. Ltd., 1 Great Cumberland Place, London W.1, can now offer Penton for sale in the U.K.

Penton is a chlorinated polyether manufactured at the Parlin, New Jersey, plant of their parent company, Hercules Powder Company Inc. It has been used in the U.S. for tank, pump, pipeline and valve linings. It can be moulded and extruded in conventional equipment and is applicable to a variety of coating processes.

Penton is available in pellet form in natural as well as olive-drab and black formulations, at prices varying between 29s and 42s a pound depending upon formulation and quantity. With a specific gravity of approximately 1.4, the lower limit of the price range is equivalent to 1s 6d per cu. inch.

Change of Address

New offices at 23-24 King Street, London S.W.1 are now occupied by Dunlop. The offices, built on the site formerly occupied by the St. James's Theatre, have been named St. James's House.

The company's head office, St. James's House, at 25 Ryder Street, London S.W.1, has been renamed Dunlop House.

French Canadian Catalogue

Negretti and Zambra Ltd. have recently produced a French Canadian edition of their general catalogue. The publication is in the French language and it is the fourteenth overseas version of their general catalogue.

Cathodic Protection

Cathodic protection of seven wing tanks and ten centre tanks of the s.s. *British Queen* for the BP Tanker Co. was undertaken by Cathodic Corrosion Control Ltd., CJB House, Eastbourne Terrace, London W.2.

The installation, involving 30 tons of special magnesium anodes, is the seventh carried out by C.C.C. for the BP Tanker fleet.

Nickel Alloys Exhibition

An exhibition illustrating the properties and uses of nickel and its alloys is to be staged by Henry Wiggin & Co. Ltd. at the Midland Hotel, Peter Street, Manchester, from 12-15 October.

The exhibition will include displays featuring the varied special properties of the Wiggin alloys—heat-resistance, corrosion-resistance, electrical resistance and special physical properties. These displays will be supported by over 350 examples of components, each of which uses one or more of the alloys covering power, transport, chemical engineering, industrial heating, industrial and domestic electrical equipment and electronics. They will be augmented by lectures and films.

New Telephone Exchange

The telephone exchange now serving the Paint Research Station is Teddington Lock, which is automatic. The numbers remain unchanged—4427/9.

Zintec Protective Lockers

Vernons Industries Ltd., Kirby, Liverpool, have supplied Zintec industrial lockers for protecting employees' clothing to Windscale. The lockers, made from Zintec sheet steel coated with electrolytically deposited zinc, are corrosion-resistant.

New Telephone Number

Union Carbide Ltd., 109 Mount Street, London W.1, have a new telephone number—MAYfair 8100.

DIARY DATES

MONDAY 21 SEPTEMBER

Inst. Metal Finishing—London: Northampton Polytechnic, St. John St., E.C.1, 6.15 p.m. 'The use of titanium in electrolytic processes for metal finishing', by Mr. A. O. F. Freund and Mr. A. H. Barber.

Soc. Instr. Tech.—Bristol: University, 7.30 p.m. 'Some instrumentation developments in the oil industry', by Mr. G. C. Eltenton.

WEDNESDAY 23 SEPTEMBER

S.C.I. with **Birkbeck Coll. Chem. Dept.**—London: Birkbeck Coll., Malet St., W.C.1, 6.30 p.m. 'Vinyl graft copolymers', by Dr. P. Weiss (Gen. Motors Corp., U.S.).

THURSDAY 24 SEPTEMBER

Oil and Colour Chemists' Assn.—London: Manson House, 26 Portland Pl., W.1, 7 p.m. 'A technologist's view of the fourth epoch', by Mr. J. A. L. Hawkey.

FRIDAY 25 SEPTEMBER

S.A.C.—Carlisle: Central Hotel, 7.15 p.m. 'Water: determination and examination.' Joint meeting of North of England and Scottish Sections. Visit to Carr's biscuit works at 2.15 p.m.

Soc. of Leather Trade Chemists—Leeds: University, 9.30 a.m. Annual conference opens.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 28 October

17 α-methyl-17-hydroxy-5 (10)-estren-3-one. Searle & Co., G.D. **822 595**

Preparation of phosphorus pentafluoride. Du Pont de Nemours & Co., E. I. **822 739**

Thiophosphoric acid esters. Farbenfabriken Bayer A.G. **822 477**

Production of vitamin A acid. Badische Anilin- & Soda-Fabrik AG. **822 685**

Dehydrohalogenation of halohydrins. Solvay & Cie **822 686**

Rubber vulcanisation on a continuous core. Franklin Research Corp. **822 791**

Tungsten carbide purification. General Electric Co. **822 688**

Catalytic desulphurisation of deasphaltised heavy sulphur-containing hydrocarbon oil fractions. Bataafsche Petroleum Maatschappij N.V., De. **822 689**

Hydroxy benzyl ethers and their use as age resisters. Farbenfabriken Bayer AG. **822 693**

Preparation of aromatic di- and polycarboxylic acids. Henkel & Cie. GmbH. **822 516**

Hydrogen purifier. Engelhard Industries Inc. **822 694**

Therapeutically effective aminonitriles and method of preparing same. Kali-Chemie A.G. **822 695**

Hydrazine derivatives and process for manufacture. Hoffman-La Roche & Co., AG., F. **822 796**

Nicotinoyl-hydrazine derivatives and process for manufacture. Hoffman-La Roche & Co., F. **822 696**

Manufacturing of DL-α-cromo-β-hydroxy-butyric acid. Frosst & Co., C. E. **822 797**

Inhibition of carburetter icing. Socony Mobil Oil Co. Inc. **822 699**

Preparation of pure myristic alcohol. Soc. des Produits Chimiques de Bezons. **822 700**

Open to public inspection 4 November

Free flowing ammonium nitrate. Standard Oil Co **822 880**

Crystallisation of common salt. Palmer Mann & Co. Ltd. **822 891**

Crystallisation of salt. Palmer Mann & Co. Ltd. **822 893**

Coated polyester film. Winterbottom Book Cloth Co. Ltd. **822 894**

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